W. Blair

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A PHILOSOPHICAL ENQUIRY, &c.

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A

Philoſophical Enquiry

INTO THE

NATURE, ORIGIN, and EXTENT,

OF

ANIMAL MOTION,

Deduced from the PRINCIPLES of

REASON and ANALOGY.

By SAMUEL FARR, M. D.

Illud modo videto, ut deum noris, etſi ignores ejus locum, et faciem, ſic animum tibi tuum notum eſſe oportere, etiam ſi ignores et locum et formam.

Cic. Tuſc. quæſt. lib. 1.

LONDON:

Printed for T. BECKET and P. A. D'HONDT in the STRAND.

M,DCC,LXXI.

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CONTENTS.

CHAP. I.

Of MATTER in general.

SECT.

I. DEFINITION of Matter; Solidity, Extenſion.

II. Of the Principles of Motion in Matter.

III. Of the Cauſes of Motion in Matter.

IV. This Subject examined more particularly.

V. Of the Motives by which the Cauſes of Motion in Matter are induced to act.

CHAP. II.

Of the particular Motions of Matter.

SECT.

I. Of Gravitation and Attraction.

II. Of the Law of Repulſion.

III. Of the more minute Principles by which the Law of Repulſion takes place; the Ether of Sir ISAAC NEWTON, and the Matter of Fire.

SECT.
IV. Of the Means by which this Principle may act, to influence Gravitation, &c.
V. Of the final Cauſe of a general repulſive Principle in Matter.

CHAP. III.

Of Vegetables.

SECT.
I. Of the general diſtinguiſhing Marks of this Claſs of Beings.
II. Of Vegetation, and the particular Motions of Plants.

CHAP. IV.

Of Animals and their Motions in general.

SECT.
I. Of the Dignity of Human Nature.
II. Of the Connection between Mind and Body.
III. Of the Organization of an Animal; its moſt ſimple Actions, or Irritations.
IV. Of Senſation or Conſciouſneſs.
V. Of

SECT.

V. Of the Origin of the Senſe of Pleaſure and Pain.

VI. Of Perception.

CHAP V.

Of the Organs of Senſe.

SECT.

I. Of Touch.

II. Of Taſte.

III. Of Smell.

IV. Of Sight.

V. Of Hearing.

CHAP. VI.

Of Imagination, and its Effects in creating Motions in the corporeal Syſtem.

SECT.

I. Of a ſpontaneous Power in the Mind to influence a corporeal Effect independent of the Will.

II. Of the Power of Imagination conſidered more particularly.

SECT.

III. Of the Actions excited by the different Paſſions of the Mind.

IV. Of the Method by which Imagination and the Paſſions excite Motions in the Body.

V. Of the Influence of Imagination, and the Paſſions over the Functions and Diſorders of the Body.—Concluſion.

INTRO-

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INTRODUCTION.

EVERY man may in ſome meaſure be ſaid to be born a philoſopher; and notwithſtanding that by many ingenious perſons the ſoul has been imagined at its birth to be no more than Carte Blanche; yet I believe the ſeeds of ſcience are originally ſown in every mind. To think and reaſon juſtly is the whole buſineſs of philoſophy, and it is almoſt always owing to the will, rather than the faculties of men, that knowledge is ſo little cultivated among them.

To receive and imbibe ideas from external objects, to retain and keep them in their proper ſtore-houſe, and to bring them forth at pleaſure, and employ

employ them in the ſeveral occaſions of life in which they are wanted, are univerſal faculties of the human mind, what have dignified it with rational powers, and diſtinguiſhed it from thoſe of the inferior creation. To what higher pretenſions can the greateſt depths of philoſophy preſume? It is not in the abilities then we ſee which may be employed by men, but in the uſe that is made of them, that perſons of ſcience are diſtinguiſhed from thoſe of more vulgar occupations. The mind, fickle in its enjoyments, as well as eager in its diſcoveries, no ſooner begins to be enlightened with the dawns of reaſon, than it is willing to extend its power over every object it finds within its reach. But yet it is too great variety which fixes it no where, and deſtroys in the bud the effect which might naturally be expected. Children are in general more inquiſitive than men; they ſee moſt objects with the eye of novelty, they enquire into

their nature and their progreſs, and they reaſon upon their origin and their cauſe. But when they grow up to be men, they perceive objects with the eye of experience, by an inſenſible kind of reaſoning they become acquainted with them, and they diſcard the exerciſe of their rational faculties, becauſe they do not immediately ſee the benefit ariſing from them.

This is the common caſe of mankind, when left to the rude proceſs of nature, untutored by education, and unacquainted with the rules of philoſophy. Under theſe diſadvantages, however, a genius might ariſe, inſpired with a love of enquiring into the works of nature, and of exerciſing the original faculties of his mind. To ſuch an one, experience, inſtead of confining him to what was naturally ſuggeſted to him, would excite to a further progreſs, and conſtitute a foundation upon which he might build a fabric of future knowledge. From ſuch a beginning we

may derive the whole ſcale of human philoſophy, firſt dictated by curioſity, and afterwards improved by emulation. For the ſucceſs with which ſuch enquiries muſt be attended, would naturally induce others to purſue them with diligence; and every man, taking his different part, or attending to thoſe objects to which his inclination diſpoſed him, would ſoon bring the whole of Nature under their deciſion. The age of philoſophy was originally confined to a few years in relation to the great truths it brought to light. And the gradual improvement it made afterwards will appear trifling, when we conſider the rapidity of its original progreſs. A ſchool of Philoſophy was invented as ſoon almoſt, as men began to think, or devote themſelves ſeriouſly to the ſtudy of things. In two centuries the whole circle of the ſciences was brought under its cognizance, and in a few more, they became ſo well known, that notwithſtanding the va-

riety

riety of opinions, which different ſects ſupported, this form of inſtruction began to decline and be neglected.—This likewiſe would have happened much ſooner, had the ancient philoſophers been as honeſt as they were wiſe. But they were men, and their natural diſpoſitions over-powered their love of learning and knowledge. In the firſt ages of ſcience indeed, they ſet out with a ſole attention to their occupation, and an utter contempt of every other purſuit. They left their antient patrimony, travelled through the moſt diſtant countries bare-foot and without food, and were careleſs of every worldly advantage, whilſt they inculcated the knowledge of the truth. But at length, they were attracted by ambitious views, ſo as to court the favours of great and powerful men, they became fond of gaining popularity by the numbers and quality of their diſciples, and they even began to feel and enjoy the benefits of wealth. To ſecure theſe things

then, mere philoſophy, grounded upon the truth of things and the phænomena of nature, was not ſufficient. Theſe when once they were diſcovered would eaſily be communicated, and the philoſopher who taught them would have ſtarved by his profeſſion. It was neceſſary then, that terms infinitely ſupernumerary ſhould be invented, formal rules be laid down for inſtruction, nice diſtinctions and definitions be maintained, and the whole farrago of ſchool-doctrine be adopted and ſupported.

From hence it happened that philoſophy, ſo far deviating from its origin, became difficult and abſtruſe; and although many things might be diſcovered ſomewhat ſooner by the encouragements it received, yet it is uncertain whether they may be eſteemed a greater detriment or advantage to the world. This inconvenience has attended them. They have ſet the moſt valuable truths beyond the purſuit of undiſ-

undiſciplined perſons, and have deterred mankind from following the bent of their inclinations, and from aſpiring to know what might eaſily be brought level to their capacities. At preſent, when men begin to be philoſophers, they are ſo diverted from the truth, by the tediouſneſs of learning the rules by which they are to attain it, that after they have made a great proficiency, they loſe ſight of the grand object of attention, and are quite ignorant of the facts they ſhould have learned by their unwearied application.—This is very much the caſe with Metaphyſics, a ſcience, when viewed in a proper light, of the utmoſt ſervice and utility to mankind. At preſent it is almoſt imagined to conſiſt in a peculiar form of reaſoning, whereas, if rightly conſidered, it reſpects the moſt valuable truths, which want no other argument than the natural and eaſy language of common ſenſe, diveſted of logical ſyllogiſms or equivocal reaſoning.

It would be impoſſible, however, even at this day, to make an univerſal as well as proper reform in this as well as other parts of philoſophy, which would not be attended with danger, uncertainty, and contempt.—We muſt reſt contented then to make the beſt uſe of philoſophy, as we find her, and as ſhe offers herſelf to our inſpection. And as we embrace the valuable products of her invention, muſt endeavour, as well as we can, to avoid the incumbrances with which ſhe is overladen.

The ſcience, to which the following Treatiſe more particularly relates, labours under the ſame inconvenience with that we have mentioned, although originally much more diveſted of it than any other. HIPPOCRATES ſtudied the human conſtitution from nature, and genuine facts that preſented themſelves to his view, and made but few remarks upon thoſe general principles which might become the cauſes of diſ-

eaſe. Philoſophy and the rules of reaſoning he diſavowed, and hence philoſophers hardly eſteemed his works as a part of ſcience. Religion indeed interfered in determining ſome facts, which had no other foundation than a blind ſuperſtition, or a fondneſs for ſymbolical numbers. Theſe influenced however every thing beſides; but as they were very fluctuating principles, and were adhered to only as a compliment to cuſtom, no ſtreſs either in medicine or any other part of philoſophy can be laid upon them; and in this view they ſhould be conſidered by all who attend accurately to the works of the antients.

HIPPOCRATES, the father of Medical Philoſophy, we may ſay however, was the moſt ſimple, plain, and inſtructive philoſopher of any of the antients. For whilſt the reſt delivered their tenets, under the umbrage of obſcure and uſeleſs terms of art, he exhibited plain truths, founded upon

facts and obſervation alone. A very ſufficient reaſon may be given too for this method which he adopted. This art was not entirely ſpeculative, as moſt of the ſciences were; it reſpected the immediate intereſt of mankind, and the moſt valuable bleſſing human nature can enjoy. It was neceſſary then, that the truths belonging to it, ſhould be delivered in the moſt ſimple, eaſy, and intelligible manner which could be deviſed.

This was the ſtate of Phyſic amongſt the firſt profeſſors of the art. But other philoſophers could not ſuffer ſuch an important ſubject, to eſcape their notice and obſervation. Excited by this curioſity, they ſtudied the human conſtitution as a part of phyſics, and in order to found a particular branch of ſcience upon it. The univerſal connection indeed that reigns between the ſoul and the corporeal part, would require an attention to many circumſtances of the latter, to demonſtrate

and

and elucidate ſome affections of the former. The ſtudy, however, coming into ſuch hands, was involved in all the obſcurity, which Logic and Metaphyſics could give it. And this at a time, when theſe ſtudies themſelves required an age to obtain a diſtinct knowledge of them.

In the æra when philoſophy ſlept, this ſcience as well as every other lay dormant; and Medicine was purſued as a mere art rather than as a part of philoſophy; was confined to the hands of illiterate perſons, and was practiſed only as directed by the moſt empirical record. But upon the rivival of learning, it naturally flowed in the channel with other ſciences. The ſcholar undertook this, as well as any other profeſſion, and it appeared more in the garb of philoſophy than it had ever done before. The works of the antients were not confined to ſchools of learning, and philoſophy was laid open to a general view. With theſe ad-

vantages, phyſicians not only attended to facts, as they were delivered by HIPPOCRATES, but ſtudied likewiſe the whole ſcheme of the human conſtitution, from the reſt of the antients. This would neceſſarily lead them to a more diffuſe view of the ſubject, and induce them to enquire into the more immediate as well as more remote cauſes of the ſeveral phænomena which appeared. Rules, however, and peculiar modes of reaſoning, were introduced with this general view. And a fondneſs, even at this time, not only of novelty, but of that fame which might dignify particular perſons, as authors of a ſect, ſoon encroached upon thoſe advantages of which real learning was poſſeſſed. The world has ſo powerful an influence upon the intereſts of mankind, that there has hardly ever been an age, in which philoſophers, as well as other men, have not directed their purſuits agreeably to its tenets.

Upon

Upon the revival of learning however, one principle prevailed, which was by no means known in its former ſtate. This was a faſhion to dreſs particular truths in diſtinct garbs of philoſophy: And it was encouraged by a blind infatuated zeal, univerſally to embrace and inculcate whatever ſeems plauſible, becauſe one man has ſpirit enough to propoſe it, without any good reaſon for its ſupport, or any proofs by which it may be demonſtrated to be right. From this circumſtance, it moſt probably aroſe, that CHRISTIANITY, the religion of GOD himſelf, and which required no other arguments to enforce it, than what ariſe from the plain dictates of common ſenſe, was made ſubſervient to metaphyſical learning, and was perverted in the higheſt degree, in order to be brought within the limits of heathen philoſophy. The genuine truths of this religion, however, have been happy enough to extricate themſelves from this

this labyrinth of myſtery, to evolve from that darkneſs by which they were obſcured from the ſight of a rational mind, and to ſhew themſelves in their proper colours.

Thus it happened with thoſe truths, upon which the everlaſting peace and happineſs of our mental natures were founded. The health of our corporeal conſtitution, though in reality of much leſs importance, was not ſo immediately ſpeculative, and required a more diſtinct contemplation. But yet this ſtudy was accompanied with the ſame obſcurity. The diverſity of the object ſeemed in ſome meaſure to countenance a difference in the method, by which it was to be learned. And becauſe the one was involved in the veil of metaphyſics, the other was confined to mechanical reaſoning. In this ſtate, with a little interruption indeed from the chemical philoſophy, medical knowledge continued for a length of years. But ſo fickle and inconſtant is the mind

of

of man, ſo inattentive to the evidences of a ſound judgment, and ſo fond of novelty, that the firſt who dared to break down the barrier of the mechanical philoſophy, attempted to advance a theory, equally injudicious, if not more exceptionable, than what was before advanced. This was the theory of VAN HELMONT and STAHL, who endeavoured to eſtabliſh the influence of a rational intelligent *Archæus*, who was thought to preſide over the ſmalleſt actions of our ſyſtem, and by a power more wiſe than the choice of moſt men, was fitted to conduct the œconomy of every function, and regulate every diſeaſe with which the human body might be infeſted. BOERHAAVE not only ſaw the errors of this, as well as of the mechanical philoſophy, but he enjoyed a power likewiſe of rectifying every inconvenience, which aroſe from them; but the remedies he propoſed were worſe than the diſeaſe, he wanted to expel. This great philoſopher

pher ſplit upon this rock. Inſtead of deſtroying the ſyſtem of either philoſophy, and erecting a new one upon natural principles, He adopted both in different parts, and thought to account for the ſeveral phænomena of the human body by the principles of one or other of theſe ſects. The reaſon perhaps of this might be, that he himſelf was diſpoſed to advance the value of that, which was oppoſed by the reigning opinion of mankind.

At the ſame time, that BOERHAAVE was the general inſtructor in phyſic to the ſouthern parts of *Europe*, HOFFMAN reigned in the north. But his works were little read, and his tenets but little attended to, till the demiſe of many of the followers of the LEYDEN profeſſion, had abated the univerſal rage for his doctrine. HOFFMAN violently oppoſed his collegue STAHL; but he leaned too much to the mechanical philoſophy, to advance a ſyſtem upon free and rational principles, founded upon

upon facts and obſervation alone, and independent of any particular form of reaſoning.

The authors, who have contributed moſt to improve this plan, are the late very excellent Dr. WHYTT of *Edinburgh*, and Baron HALLER: the former of theſe gentlemen publiſhed ſome years ago a very ingenious eſſay upon the vital and involuntary Motions of Animals, in which he has very accurately ſhewn the method by which theſe inconſcious powers act, and demonſtrated very clearly that they depend on a nervous influence, and a power of the mind: He has likewiſe ſhewn that this power extends to the minuteſt veſſels of the human body, none of which are moved but upon the ſame principles, with thoſe which are more evident and conſpicuous. Baron HALLER deſerves ſo much of the world, for his no leſs valuable than voluminous publications; that an attention to particular theories could hardly be

be expected from him. Notwithſtanding this, however, he has produced one of the moſt ingenious diſtinctions that was ever obſerved in nature: This is a difference which he perceived between the irritable and ſenſible part of Animals. This difference was founded upon fact and obſervation, and altho' perhaps his ideas of the cauſes from which it might ariſe, do not entirely correſpond with what we have advanced, yet we muſt acknowledge it has conſtituted the foundation upon which we have built the enſuing theory.

Upon a careful review and attention to this ſubject, I could not but think that it deſerved a more enlarged attention, and that upon this alone, a ſyſtem of phyſic might be eſtabliſhed I thought I could diſcover ſome principles borrowed from analogy, by which ſuch an idea might be ſupported, and that in this purſuit, not only the truth in general might be eſtabliſhed, but

that ſome important lights might be thrown upon parts of Phyſiology, which have been but little attended to, have been injudiciouſly accounted for, or conſidered of no value. I muſt acknowledge too the great advantages I have received from my worthy preceptor Dr. CULLEN, who in his excellent lectures on Chemiſtry, particularly thoſe on the Matter of *Fire*, has enabled me to eſtabliſh my Theory of Analogy, upon principles much more firm and ſtable than I could otherwiſe have deviſed.

The method in which I have arranged my ideas, the ſentiments I have produced, as well as the language in which they are exhibited, muſt plead their own apology. I introduce my thoughts with the greateſt diffidence: I do not attempt to inſtruct, no, nor even to entertain mankind. Theſe are advantages I can hardly expect; but if I have given a train of reaſoning to an abler hand, who may extend it,

through

through the whole univerſe of nature; if I have hinted at a propoſition which an exalted genius may improve to a certain demonſtration; if I have contributed my mite to the improvements of future ages, it is all I can deſire the candour of the world to allow to a daring, though unworthy offspring.

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CHAP. I.

Of MATTER in general.

SECT. I.

Definition of Matter; Solidity; Extenſion.

NO definition, or deſcription of Matter, can be given with ſuch accuracy, but what will be liable to very powerful objections; and theſe are not

only ſuch as might ariſe from the cavils of captious diſputants, but likewiſe from the ſuggeſtions of acute and candid reaſoners. Neither common-ſenſe nor philoſophy are ſufficient of themſelves, to demonſtrate to every mind the truth of its exiſtence, much leſs to deſcribe the properties that belong to it. Both muſt concur to make a ſure and certain demonſtration. By the acute reaſoning of Philoſophers, we may no doubt arrive at the knowledge of ſome of its forms and accidental modes. But common-ſenſe can more eaſily inform us of theſe, unaided by philoſophy, and it can riſe higher in exhibiting to us its more eſſential properties and the cauſes that gave them being.

To every man's own judgment then, common-ſenſe is a ſufficient director ſo far as it goes, but it is not fitted to inſtruct the reſt of mankind, in a knowledge of which they are ignorant. Reaſoning upon facts and circumſtances, which are previouſly ſettled



ſettled in their minds, is the only method by which we can inſtruct others in what they do not already know. This is the buſineſs of the Philoſopher, which may be evident from the following example. The law of gravitation, was diſcovered and made known to the mind of the inventor, by the dictates of his own underſtanding; but it was afterwards confirmed to his conceptions, demonſtrated to the reſt of mankind, and made ſubſervient to higher purpoſes by mathematical reaſoning. An Indian or a Savage, bred up in the wilds of Barbariſm, knows that when a ſtone is thrown out of his hand, it will not fly into the air, but with a determined force which he gives it, and that it will ſome time or other return to the ground; but the greateſt Philoſophers, till a Newton aroſe, had never diſcovered, that the whole univerſe was actuated by the ſame principle.

IN the ſame manner, every property of Matter may be diſcovered. Philoſophy can never diſcover the facts, it only reveals the extent of thoſe facts, after they are once made known. It is original facts only that are neceſſary in an enquiry into the nature and eſſential properties of Matter; we ſhall appeal then to thoſe only that are apparent and evident to the common underſtandings of mankind, in the deſcription we are going to give of them.

THE firſt property that we may take notice of in Matter, is, *Solidity*; and, perhaps, this is the only eſſential property of which it is poſſeſſed, and every other may ſpring from, or be dependent upon it.

THAT Solidity is a property of Matter, all our ſenſes conſpire to inform us, and the moſt abſtruſe reaſoning joins in the aſſent. We ſee, and we feel continually, bodies of various forms, all which agree in

in theſe particulars, that they are compoſed of different and diſtinct parts, ſeparate from each other; that theſe parts can never be conjoined, ſo as to be made into one, and that they have all a fixed invariable ſituation. It is likewiſe equally evident, that every diſtinct *form*, has an abſolute place or ſituation allotted for it in the univerſe, and that no other part of Matter, can occupy that place, or fill up that part of ſpace, whilſt that body remains in it. From this it will appear, that Matter cannot exiſt without Solidity, and that whenever the idea of it is ſuggeſted to us, that of Solidity is always joined with it. In what then does Solidity differ from Matter, and why is it eſteemed a property only of that, which ſeems to be the ſame thing as itſelf? Matter muſt be conſidered as nothing but an aſſemblage of properties, which are eſſential to its nature, or theſe properties are ſo neceſſary to it, that we cannot diveſt ourſelves of the idea of them, whenever it is offered

to our conſideration; and in this view, Solidity is to be conſidered only as one of the moſt eſſential. This will be more clearly proved, when we have conſidered Extenſion, but at preſent, let us refer it to our ſenſes.

THE leaſt attention will ſhew us, that there is no difference between the ſubject and its qualities. Notwithſtanding this, however, there is a principle in mankind, of appropriating qualities to their ſubjects, although either of them, diveſted of each other, have no exiſtence in nature. This is the caſe in the preſent inſtance, for it is impoſſible we ſhould entertain any idea of a material ſubſtance as ſuch, without Solidity, or that Solidity can belong to any thing but ſuch a body. Notwithſtanding this poſition is evident to philoſophical reaſoning, as well as common-ſenſe, yet the diſtinction between Matter and Solidity was not introduced by the former, but was rather founded upon one of the means by which

which common-ſenſe arrives at information. Solidity is not immediately diſcovered by all our external Senſes, but is peculiar to *feeling*, *taſte*, and perhaps *hearing*. Upon this account, we might ſuppoſe, that if we could be diveſted of theſe ſenſes, we might have an idea of Matter, without Solidity. I never knew a man who was poſſeſſed of the ſenſe of ſight alone, but if ſuch an one could be found, the idea of Solidity, I believe, would not immediately ſuggeſt itſelf to him, but it would require ſome degree of induction and mathematical reaſoning to acquaint him with it. From this we may infer then, that the idea of Solidity is not ſo abſolutely connected with Matter, as was firſt imagined, but depends in a great meaſure on our external ſenſes.

ANOTHER property that belongs to Matter as eſſentially as Solidity, is, *Extenſion*. We become acquainted with this property likewiſe by one of our ſenſes, but a dif-

ferent one from either of thoſe, by which we diſcovered Solidity, viz. that of *Sight*. Genuine reaſoning, however, may reſolve theſe properties both into one, and can diſcover that it is only as they refer to different ſenſes, that they can be diſtinguiſhed from each other. Whatever is extended, muſt have Solidity, for parts muſt appear ſeparated, or extenſion cannot take place. Again, whatever is ſolid, muſt include in it Extenſion, for parts which are ſeparate from each other, cannot exiſt in the ſame part of ſpace. However, we make a diſtinction in our minds between theſe properties. Thus, for inſtance, when we view a mathematical diagram, we have no idea either of Matter or Solidity, but Extenſion is ſimply preſented to us. From this, Extenſion might appear to us a more abſtract idea, than Solidity. Extenſion quaquaverſum is the beſt fitted to give us the idea of Solidity. There is no difficulty in finding inſtances of men who have been born blind, have remained in this ſtate during the whole

whole of their lives, and have never been able to diſcover many objects peculiar to that organ; and yet there is no doubt, but that theſe men have an idea of Extenſion. This may be ſuggeſted too without the employing of induction. The idea may be conveyed to their minds by means of feeling, from ſucceſſion, which muſt always take place to excite the idea of Solidity.

As we have diſcovered theſe properties of Matter by our ſenſes, we may think we have ſufficient grounds to venture upon a definition of it from this ſource; that it is a ſubject which appears to our ſenſes, ſolid and extended; or endued with Solidity and Extenſion.

BUT how fallacious is ſuch a definition? Our ſenſes may be deceived, and diſorder may induce us to ſee an extended body, or to feel a ſolid one, when no ſuch thing exiſts in the circumſtances we may imagine. And, on the contrary, bodies will be ſolid

and

and extended, and Matter will be Matter, whether we have our ſenſes entire and perfect or not.

NOTWITHSTANDING this, however, it is originally by our external ſenſes, or rather by the natural and eaſy induction that is made by common-ſenſe, that we arrive at the knowledge of the exiſtence of Matter, as well as, that it is indued with the properties we have conſidered. But it is not always neceſſary to enter into a diſquiſition of properties, in order to explain the ſubject matter of them. Every one has a clear and ſatisfactory proof in his own mind, of the exiſtence of Matter, as well as, that theſe are properties which eſſentially belong to it, without the aid of a definition, or the influence of philoſophy. We have need to appeal then to nothing but what is level to one of the meaneſt capacity; who would only think his underſtanding degraded, and his judgment abuſed, to be queſtioned upon ſuch a ſubject.

We

WE ought not to be anxious to deſcribe, or define what *Matter* is; but only to ſhew what is generally thought to be Matter, muſt be conſidered as ſuch. And of this we want no proof, becauſe it carries with it its own evidence; and every attempt to make a demonſtration, would only weaken its influence. We ſee it, we feel it, and continually experience it, by all our ſenſes; and as long as theſe ſenſes exiſt, we muſt become acquainted with it: for when Matter is diſſolved, our ſenſes will have nothing to act upon, and will become of no uſe. It is the object upon which they are conſtantly employed, and from which all our ideas of ſenſation ariſe. This is ſuperior to every definition, which is at beſt but an awkward form of philoſophy, and can only be employed upon very abſtruſe ſubjects, or the reveries of our own imagination. But the exiſtence of Matter is ſo evident and clear a propoſition, that it is only the cant of learning which can make it obſcure,

and

and the fallacious reaſonings of a viſionary, which can make it dubious.

WITH both theſe defects it has appeared in the world. The firſt, indeed, might have been the reſult of philoſophical reaſoning, tending to confirm what common-ſenſe had ſuggeſted; but the latter can be conſidered as no more than the fanciful project of a flighty imagination, in oppoſition to common-ſenſe, and inconſiſtent with ſound reaſoning. Mankind are ſo fond of indulging every thing that has the leaſt appearance of genius, that they often forfeit their judgment for the ſake of novelty; introduce fallacious and incoherent maxims, rather than ſuffer obſcurity; and, in fine, rather than conſent to an old doctrine, tho' ever ſo plauſible, they prefer ſcepticiſm to a want of reputation, and draw a veil over the truth, to conceal the errors of their own imagination.

SECT.

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SECT. II.

Of the Principles of Motion in Matter.

HAVING conſidered the general notion of Matter, we are now enabled to take a view of its powers and diſpoſitions, or ſome of thoſe affections with which we ſee it occaſionally endued.

To us living beings continually in action, and either operating upon Matter ourſelves, or perceiving it operated upon by ſuch other beings; or, on the contrary, motionleſs and in a ſtate of inactivity; it appears to put on the affections, either of *motion* or *reſt*. It is neceſſary that we ſhould enquire, upon what foundations theſe diſpoſitions are grounded; and whether they are principles neceſſarily inherent in Matter, or entirely independent of it. Philoſophy has at times, adopted the notion that both theſe affections were eſſential to it, and without

which, it could not exiſt. But how vain and inconſiſtent ſuch reaſoning is, I preſume will be determined by every one, who views it with the eye of candor. But to examine it ourſelves.

THE preſent philoſophy has very much exalted the ſtate of *reſt*, by annexing it to Matter as an original, if not an eſſential property. They have even attributed to it the title of a power or energy, a force, a vis, a ſomething which appears as inconſiſtent with it, as if they had given the power of light to darkneſs, or of ſight to the blind. But let us examine it more circumſpectly and attentively, in order to determine how far this notion approaches to the truth. It is certain, indeed, that to our ſenſes, every thing appears at reſt, untill it be moved by ſome agent, ſuch as ourſelves; whom we may preſume at preſent to act entirely independent of Matter; and that there is ſomething like a *vis Inertiæ*, or power inherent in bodies, by which they

they ſeem diſpoſed to continue in that ſtate. But it is a very fallacious way of thinking to imagine, that this is really a power; and it depends upon too great a negligence in the uſe of terms. For what is power or energy? Is it not a diſpoſition to *act* either ſpontaneouſly, or in conſequence of ſome former impreſſion? Thus the power of the human will, is that power by which we may exerciſe the muſcles of our body by a ſpontaneous action of our mind; and notwithſtanding the mind is often inactive in this reſpect, yet the power ſubſiſts, while the inſtruments have the diſpoſition to be brought into action; but if by any accident or diſorder, any of the muſcles ſhould become incapable of acting, we may juſtly ſay, that the power is abſolutely loſt. Again, the human mind, with regard to itſelf, is poſſeſſed of a power, firſt of receiving, and then of aſſociating ideas; and this is an inſtance of a power to be exerted in conſequence of a former impreſſion; but is no more

more a power, than whilſt the mind is capable of thoſe affections. Let us try Matter then by theſe rules, and ſee if it be endued with any ſuch power as what we have been mentioning. It ſeems to be an abſolute contradiction to ſuppoſe it; for can we imagine any thing in an abſolute ſtate of reſt, which ſhall include in it a diſpoſition to action; or is it more diſpoſed to motion, than when that affection has taken place? Again, if the power be to continue in that ſtate of reſt, then, that ſtate of reſt muſt be a ſtate of action, becauſe power is a diſpoſition to act. The reſult of ſuch reaſoning will be this, that Matter, being at abſolute reſt, is diſpoſed to act, in order to continue in that ſtate. And thus we have a ſtate of inactivity endued with action, or a motionleſs motion, than which nothing can be more abſurd. So far with regard to the term, which has only been invented, perhaps, for want of a better; or from an inclination in mankind, to give every thing in ſome meaſure

meaſure the appearance of dependent cauſes and effects, without conſulting the impropriety of names, or the fallacy of ſuch reaſoning. But it is of no great conſequence, whether we ſuppoſe it a power or not, when we conſider this affection by no means as inherent in Matter, or dependent upon any of its properties. For if we exclude it entirely from Matter, any terms that are applied, can be of no value. We ſhall call it therefore a *ſtate* of reſt, and in examining whether it belongs to matter as a property or not, let us appeal to *common ſenſe*, the moſt impartial judge in ſuch caſes. We obſerve a body or piece of Matter, totally at reſt, but in ſuch a ſtate as that, we know it may be moved; and upon different occaſions, we have ſeen it moved before, although at preſent, we obſerve the power of motion has ceaſed. To what would a common underſtanding attribute this reſt then, which he ſees it enjoy? Would he imagine it to depend on ſome power inherent in itſelf, or a diſpoſition to that ſtate; would he think that it had received

any acceſſion to its properties, or that it differed in the leaſt from what it was when in motion, except that it enjoyed a different ſtate. Suppoſe a man ſhould throw a bowl out of his hand, and ſtrike it againſt the ground, where it remains at reſt; does he imagine the bowl is different in properties, from what it was when in motion? No. But he conceives of it in this manner; that the reſt, or ſtopping of this bowl, is entirely dependent upon his own ceaſing to act upon it, and ſuffering it to continue in that ſtate. From hence it may appear that this ſtate, is only a negative to that of motion, and where that ceaſes, this muſt always obtain. It will be neceſſary therefore to examine a little into this ſtate of motion, in order to explain more particularly both theſe affections.

MOTION is very probably that ſtate that obtained firſt in the univerſe, and we never entertain the idea of reſt, but that of motion always ſuggeſts itſelf with it. But by all our ſenſes, we are accuſtomed more

more to motion, than we are to reſt; hence it happens that we refer every thing almoſt to that ſtate, and from this it was, that the moſt antient philoſophy eſteemed it as an eſſential property of material ſubſtance. This doctrine has prevailed very much ſince, but it has been the origin of one, the moſt injurious to the human, as well as divine nature. Direct Atheiſm was ſoon ſuggeſted by it, and the materiality of the ſoul was its genuine offspring. If motion was a principle of matter, then matter could do every thing, could create, form, and deſtroy, could think and act in the human mind, and was capable of infinite wiſdom and power. But this doctrine was no more iniquitous than falſe, and may eaſily be confuted by the moſt vulgar underſtanding.

To diſcover, however, whether motion be an eſſential property of Matter, we muſt previouſly enquire into the cauſes which give riſe to it: But this muſt be the object of a particular Section.

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SECT. III.

Of the Cauſes of Motion in Matter.

IN every object of nature, that preſents itſelf to our ſenſes, we are deſirous of ſeeking a cauſe for almoſt every circumſtance which belongs to it; and we are willing always to attribute it to ſomething that appears to us plauſible enough to produce theſe effects. But we are as often miſtaken, as informed in this point. The mere ſuggeſtions of fancy, are not always ſufficient for the purpoſe. We muſt ſometimes aſcend higher, we muſt examine every thing carefully and with attention; we muſt draw analogies from many other objects which ſurround us; and, in fine, we muſt reaſon fairly, and from long deductions, in order properly to attain a knowledge of the origin of the Phænomena of nature.

SOME-

SOMETHING of this muſt be admitted here, in our enquiry, concerning the cauſes of the more general motions, which we often ſee produced in the univerſe. Many of theſe, and the effects conſequent upon them, we ſee produced from ſome prior motions, that have taken place; but are we to conclude from this, that theſe motions are the original cauſes of theſe things, and be left afterwards to account for the cauſes of theſe motions themſelves? Let us rather try if we cannot diſcover the univerſal origin of all, from one ſimple uniform principle. Common-ſenſe, will in ſome meaſure, tend to inform us of this truth, although in this reſpect, it is not ſo accurate, but it wants the aſſiſtance of analogy and higher reaſoning to confirm its ſuggeſtions. For it is never ſo perfect, but as it is often thwarted by the interruptions of fancy, ſo it draws its principles too frequently from the flights of imagination. It is the moſt complete, when confirmed by juſt reaſoning.

WE may divide the actions or motions that we ſee produced in nature into two ſorts, thoſe which evidently acknowledge the action of ſome ſpiritual Being upon them, endued with a locomotive faculty in itſelf; or thoſe which ſeem ſpontaneous, and which we can refer to no direct cauſe. But are we to deduce upon this account ſuch actions from no cauſe, or which is next a-kin to it, acknowledge the influence of a *material* cauſe? The moſt rational kind of argument ſeems to be this; that as we ſee many actions produced by Beings which are already denominated ſpiritual and immaterial, and that Motion is a certain and neceſſary effect of their power; why may we not refer thoſe that acknowledge the moſt ſecret cauſes to the influence of ſuch Beings, although of a higher and more exalted nature, in proportion to the effects to be produced by them.

I MOVE a ſtick or a ball, at which time I am conſcious to myſelf of no prior action upon my Body as the cauſe of the motion which I produce, but it appears as the mere ſpontaneous effort of my will. I ſee another man do the ſame thing, and I argue, that his will is as intimately concerned with that motion, as mine was with the former; and if I ſhould ſee a thouſand actions of the ſame kind, I always refer them to the ſame principle. But I likewiſe ſee the Sun or Planets revolving in their reſpective ſpheres; and many other actions produced where motion is perceived, but there is no peculiar agent to which we can aſcribe the effect; but what forbids that I ſhould not acknowledge, that an inviſible Being of the ſame nature as myſelf, though infinitely more perfect, ſhould be the immediate cauſe of the revolutions of theſe Globes, in the ſame manner as myſelf or any other Being was the cauſe of the motion of the ball in my hand, which was beforementioned. This is an argument drawn

from Reaſon, from my own nature, what a Savage upon reflection would imagine, unaided by learning, untaught by philoſophy, and unbiaſſed by the prejudices of education.

AND indeed this is a fact: the commonſenſe of mankind generally leads them to think, that theſe ſtupendous machines are immediately actuated by the power of the Deity; and if it had never been diſcovered that they were influenced by a peculiar principle, Philoſophers would have thought ſo too: but in maintaining this as an effect, they neglected or forgot the cauſe by which it was produced. The Law of Gravitation, a principle of ſuch infinite importance to mankind, and which will for ever immortalize the name of its author, has nevertheleſs this flaw, it partakes too much of Matter: Of this Sir Iſaac Newton himſelf was aware, and he would gladly have evinced the action of the Deity as the cauſe of it; but probably he thought it too

too metaphyſical, could not properly be introduced into a mathematical ſyſtem, and would leave a door too open to Uncertainty and Scepticiſm. He was willing to tread upon ſure ground; and although he went one ſtep higher than could be abſolutely demonſtrated, yet he made no other improvement of this fact than extending the chain of matter a little further; and even concerning this, his modeſty, which ought always to be admired by every ſearcher into truth, forbad more than conjecture.

THE Law of Gravitation was ſo univerſal a principle, that it did not immediately attract the attention: The vulgar indeed would never have thought it worth while to think of it; it was ſufficient for them that ſuch a law was eſtabliſhed: But it was no ſooner diſcovered by the inveſtigators of truth, but they were willing to find out its cauſe alſo. But how they could ever attribute it to a principle inherent in Matter, is inexplicable, and argues how much

much mankind are often inſtigated by fancy, more than the dictates of common-ſenſe, or a ſound Judgment. It might have proceeded perhaps from a miſtaken reſpect to the Author of their exiſtence; or an inconſiderate devotion might induce them to believe, that it would depreciate the character of the Deity, to be ſo intimately concerned with human affairs. And thus, rather than be guilty of an imaginary impiety; they run the riſk of deſtroying the very eſſence of that nature, which was the object of their adoration, reduce his immenſity to nothing, and perhaps make materiality one of his eſſential attributes.

BUT what is there in the general idea of Matter, that ſhould induce us to think, that this Law of Gravitation, or any other law of motion, ſhould eſſentially belong to it? That Motion is an inherent property of Matter we have already endeavoured to diſprove; but it may be alledged, that although in the general abſtracted idea of it,

it

it is not an eſſential property, yet that the Deity may have originally impreſſed it with this faculty at the creation of the univerſe. This however, as well as the more general argument may I think be invalidated by this ſimple anſwer, viz. That if Motion were ſo eſſential a property of it even in its preſent ſtate alone, it muſt continually be in motion, and that property be neceſſarily attendant upon it; or elſe, that it muſt be endued with a degree of ſenſibility; or a power of moving, in conſequence of impreſſions made upon it by ſpiritual Beings. That it does not enjoy the former of theſe affections, is evident from this, that bodies are ſo frequently found at reſt, and afterwards have their motion renewed. And the exiſtence of the latter, would either endue every part of Matter with a peculiar mind, or reduce all action to material influence.

FROM all that we have ſaid then, we may deduce this concluſion: That there is nothing in Matter that promotes its own action, but that it receives all its motions from ſome ſpiritual Being, who is himſelf endued with abſolute activity and ſpontaneous motion: That in the ſtate in which we continually obſerve it, it is entirely paſſive, and that whenever it is ſeen to move, it is influenced by this immaterial cauſe; either that Being perhaps, who ſuperintends the whole Univerſe, and is immenſe as well as omnipotent in his exiſtence; or elſe, ſome inferior Nature ſuch as ourſelves, who are conſcious of being endued with ſuch a power in a lower degree, that we can move ourſelves whenever we pleaſe, or excite other parts of Matter to motion.

IN all our ideas of Motion with regard to Matter, we muſt take into conſideration the Agent who cauſes and directs that action, and the patient or body upon which it

it acts: The Agent muſt neceſſarily be a ſpiritual Being, devoid of Matter and independent of any bodily affection. It may be imagined very difficult to form any idea of a ſpiritual Being; we are converſant ſo much with corporeal forms, and from our external ſenſes we experience nothing beſides. But we may derive information likewiſe from our internal faculties, which can never deceive us. We are conſcious within us, of ſomething abſolutely independent of our organs of ſenſe; we are conſcious too of perceptions even from them, that are entirely ſufficient to convince us, that it is not owing to any material ſubſtance that Ideas are conveyed to our minds. To think is one of the greateſt bleſſings of human nature, as it informs us of many juſt and valuable truths; but it is a peculiar ſource of happineſs to us, as it leads to the knowledge of the ſupreme Intellect, who governs through all material ſubſtances, and is the Creator of our exiſtence. For He is original, and we are derived only from his Eſſence.

Eſſence. He is the ſupreme Creator of all things,---we poor humble creatures.---He is the Sum of all Life,---we the poor penſioners of an Hour. It is from our own, however, that we are enabled to judge of his Exiſtence and his Power; and if we can move the muſcles of our bodies, what is there which He cannot effect with eaſe and pleaſure?

SECT. IV.

This Subject examined more particularly.

LET us enquire a little further into this ſubject, and ſee if we cannot bring this doctrine of ſpirit to a determinate, intelligible, and approved ſtandard. It may be objected to us, that our ſenſes may be deceived, and in conſequence of that, we ought to refuſe the deciſion they ſhall bring to any fact. The influence even of our internal

internal feelings likewiſe, may be diſqualified from determining any thing more than what they immediately ſuggeſt. Thinking it may be alledged, is a proof of thought in that Being who is conſcious of it, but is no certain argument that it exiſts in others, even of our own ſpecies, much leſs in any other ſcale of Beings. To determine this point, we muſt argue in the following manner. Every man experiences within himſelf two diſtinct parts; the natural ſtate of one of which, is to be at reſt, the natural ſtate of the other, to be moveable and active. He finds likewiſe, that when he wants to alter the natural ſtate of the former of theſe parts, that he is obliged to make uſe of an impulſe of the latter. Now this alteration can never be induced, but Motion muſt ariſe to procure or effect it, or this change can be influenced by nothing prior to the taking place of action. Motion then is the firſt effect that is produced in our bodies by our minds, and is neceſſary for the production of every other: And likewiſe

likewiſe whenever it is occaſioned, it is always by means of that thinking active principle, of whoſe preſence we are conſcious within us. Whenever therefore we perceive a motion or a change of ſtate produced in the bodies of other Beings, which we continually do every day of our lives; we are naturally led to conclude, that this is procured by the ſame principle which we know directs our own actions.

IF we can juſtly refer the foregoing obſervation, to all thoſe beings of our own ſpecies that we obſerve exerciſing this power; and beſides this, who will acknowledge the influence of ſuch a principle, to invoke them to action; it will ariſe to more than a probable proof, that every motion that we ſee produced in nature depends upon ſuch a power, and is performed by ſome ſpirit acting upon it and directing its effects. That all the actions even of animal Beings, are performed by a ſpiritual cauſe, we confeſs is not evident, at firſt ſight:

But

But we ſhall endeavour to prove hereafter, by a long deduction, that theſe as well as every other action of nature, are owing to the ſame principle. At preſent our ſubject leads us to this obſervation, that there is nothing inconſiſtent in itſelf, or repugnant to common-ſenſe in the notion of an univerſal influence of ſpirit over Matter. We can have no true idea of Matter, but as connected with its eſſential properties of ſolidity and extenſion, and in this, Motion can never be included; when we ſee it then produced, we are naturally led to ſeek for a cauſe from ſome other ſource. We find the fountain from whence it ſprings, we determine its exiſtence, and we conclude it to be its cauſe. There is nothing in the original nature of cauſe that ſhould include Matter in it, any otherwiſe than as ſecondary to a prior one; and the idea of cauſe leads us as ſoon to ſpirit, as the idea of effect leads us to Matter. It is only thoſe that by a narrow confined view, can

conceive of things merely as they appear to exiſt, and are incapable of referring them to their cauſes, that can admit the idea of material ones. They who reaſon juſtly, will undoubtedly be led to imagine, that the firſt original cauſe in nature muſt be ſpiritual, as well at that ſublunary effects are material. Thus when I ſee a man walking before me, and the idea of the action ſolely enters my mind, I may conceive of it as a mere effect of Matter in a ſtate of motion, or moving from one part to another; but when I reflect upon this action, endeavour to account for it, and refer it to a cauſe, I always then look upon it as the action of a ſpiritual Being, and influenced by that thinking principle that reſides in his breaſt. And no natural reaſoning will ever convince me that it is the mere mode of Matter, or the effect of an unknown quality that belongs to it. The ſame reaſoning will hold good, when we reflect upon higher natures, and the ſtupendous

pendous effects that are produced in the univerſe.

There is, beſides what we have mentioned, another means, by which mankind are liable to fall into error, and have their judgments obſcured, whenever they reflect upon this ſubject. This is the confuſion that ariſes from want of diſtinguiſhing the power that Matter has of communicating Motion, from that original principle which gives the firſt ſpring to its exiſtence. This is indeed certain, that one material ſubſtance will often be ſeen to occaſion the motion of another; and this not only in the ſame direction, but in contrary ones. The former part of the poſition may eaſily be explained. Bodies in that caſe muſt be taken not ſingly but collectively, and the force that is exerted muſt be conſidered as if there was only one body extended to the bulk, we ſee the different ſubſtances that act upon each other. This law can never take place, but upon con-

tact, and that with regard to Motion, will be the ſame as if bodies were abſolutely joined together, ſo as to make but one part of Matter. The latter part of the poſition is more difficult to underſtand and explain; and as it reſults from ſome particular motions of Matter, we muſt refer it to their conſideration.

SECT. V.

Of the Motives upon which the Cauſes of Motions in Matter are excited to act.

WE have hitherto endeavoured to determine, that Matter is an inactive motionleſs ſubſtance, and that Spirit is that power that gives exiſtence to its Motion, and cauſes the different revolutions of nature: Let us now examine ſome peculiar circumſtances that reſult from the connection between them, and enquire into the nature

nature of Spirit more particularly. We have already ſpoke largely of Matter, and given that deſcription of it, that ſeems moſt agreeable to common-ſenſe: But we have conſidered Spirit only as endued with activity. It may enjoy perhaps other properties, that it will be neceſſary to evolve, in order to diſcover its full extent in creating, or cauſing Motions.

WE have alledged, that Motion ariſes from a ſpiritual ſubſtance, or ſomething *ab extra* in bodies; but we may go ſtill further, and enquire into the motive upon which Spirit itſelf is endued to action, or the cauſe that occaſions it to exert its powers. We do not ſee Matter always in action, neither do we perceive in it a conſtant endeavour to Motion; but there is a ſtate of reſt, the negative to Motion, which it often times enjoys: When ever then it is excited to alter this ſtate, it is not only neceſſary to call up Spirit for this purpoſe; but there muſt be ſome motive, ſome reaſon given

why this change ſhould take place, or otherwiſe it would always continue in its original condition.

MOTION, it may be alledged, perhaps, is eternal, and the original ſtate of nature; and that there is no ſuch thing as abſolute reſt, but in the imaginations of men. This reaſoning however will have no effect here, becauſe we are certain that a relative reſt between certain parts of Matter, does take place; and if this is the caſe, a motive muſt be allowed, to re-aſſume Motion, if not originally to give it Matter. In conſequence of thoſe motives that are neceſſary to excite motions in material bodies, we may obſerve that Spirit is not only endued with activity, but is in ſome meaſure paſſive and is itſelf at reſt, till rouſed to particular actions by theſe cauſes.

BUT let us now enquire into the peculiar motives that operate in exciting theſe cauſes to act. The firſt and moſt original that offers

offers to our conſideration, is the ſpontaneous will of that Being who gives life and motion to all things, inſtigated by nothing but his own pleaſure, to order and direct whatever actions he thinks fit: Theſe actions may ſeem entirely ſpontaneous, and to be diveſted of all motive, but if ever material Creation had a beginning of exiſtence; and if the leaſt alteration has taken place ſince their firſt origin, there muſt be ſome concealed and unknown cauſe why this ſhould take place, or action could never be produced. Theſe motions are truly beyond our conceptions, but they are what direct the great and ſtupendous works of nature, ſuch as were firſt excited by the great Author of our being, and ſuch as continue in the exerciſe of his power throughout the univerſe. But actions may not only be induced in this ſpontaneous manner, but they very frequently acknowledge more ſenſible motives, and may ariſe from the perception of other motions that already began in

Matter, or a ſtate of reſt that has taken place. Thus if it is perceived by a ſpiritual Being that one part of Matter is liable to become deſtructive to another, a kind of third or mediatorial action may be interpoſed to prevent its deſtined purpoſe; or if it is perceived to be ſalutary, to promote this end. This is evidently no ſpontaneous action, but ariſes from a motive ſuggeſted by another action previouſly excited. Perhaps it may be neceſſary that ſpontaneous action ſhould firſt ariſe to give exiſtence to this, and it may only follow as an effect of its influence; but it is very different from it, not only in its nature, but likewiſe perhaps in the different kinds of being upon which it is often exerted.

WE cannot be certain of the extent of ſuch actions, they muſt probably reign through all nature; but we are ſure of their exiſtence in the human conſtitution. We muſt beg leave to call them ſenſible actions,

actions, becauſe they ariſe from a perception of actions in other bodies*.

WE have now ſeen not only the immediate cauſes of the motions of material ſubſtances, but have enquired likewiſe into the motives from which they ariſe; and by this we are qualified to enter more particularly into the explication of the different kinds of motions in the univerſe. What we have already mentioned has been entirely material, determined, and fixed to one peculiar kind of ſubſtances, and inſtigated by one

* The term Senſe may be employed here, whilſt the the ſignification is ſo general, and not oppoſed to any peculiar circumſtances of our conſtitution. It is rather too unlimited a term; but as the principal actions of this kind, are the ſenſible actions of animals, we need not be under much concern, to apply it analogically to other beings, after we have declared our intention. Senſation does not always convey with it the idea of conſciouſneſs; this we ſhall explain hereafter, but previous to that conſideration, it was neceſſary to warn our readers of this exception, leſt they might be apt to confound theſe principles, in many applications that may be made of them, particularly in this place.

one univerſal principle. We ſhall not only enquire more particularly into the modes by which this Agent operates upon it; but alſo into the actions of more particular beings, confined to a narrow region, inſtigated by ſublunary views, and very much circumſcribed in their action.

CHAP.

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CHAP. II.

Of the particular MOTIONS of MATTER.

SECT. I.

Of Gravitation and Attraction.

TO compare the motions of what we call inanimate things, with what we underſtand to be alive and animated; or to explain from their actions thoſe that we may obſerve in ourſelves; may appear too mechanical for the preſent philoſophy, and ridiculous and inconſiſtent in itſelf. In the following treatiſe, however, we hope to accompliſh both theſe purpoſes, and yet avoid ſuch general cenſures. We ſhall begin with the particular actions of material Subſtances, as they

are

are in themſelves the moſt extenſive, actuated by the moſt general principles, and and the moſt evident to the common underſtandings of mankind.

THAT this world, and the whole univerſe, perhaps, was actuated by a mind or ſoul, in the ſame manner, as the motions of our bodies are directed by a living principle, was a very antient notion of philoſophy: Although this principle may be falſe in the manner that antiquity conceived of it, viz. as a peculiar being appropriated to this ſyſtem, to receive impreſſions and perform motions independent of any other; yet that all the particular motions of matter are directed by a ſupreme Mind, as we have already ſaid, may have a very juſt foundation. But whether all theſe motions are actuated by one principle or not, is not our buſineſs to enquire. It is ſufficient for us to ſhew that any mind is concerned in them, and that they are not merely affections of matter, or an original impreſſion given

given to it at the creation. In the particular motions of matter, we may obſerve, indeed, the moſt ſimple principles, and all directed by very few laws. If we attempt to infer from this, that the actions which reſult from them, are not immediately but originally impreſſed, we are guilty of a great error, in miſtaking peculiar actions for a general law. The latter is regular, uniform, and ſimple, but the former may be highly complicated, and admit of the greateſt variety.

THE laws of Gravitation are conſtant and accountable, but the actions which are influenced by them, may be very inconſtant and unaccountable. For inſtance; It is a fixed law of God, that the Earth ſhall revolve round the Sun in a ſtated time, and never alter its courſe; but the effects of this revolution on our earth are diverted by a thouſand circumſtances; cloudy days, moiſt earth, unfruitful and worn-out ſoil, and the differences of climate and ſituation, all contribute their ſhare, though by the

ſame

ſame laws, to make the greateſt confuſion and variety in the effects produced by them. But to examine theſe motions more particularly.

THE moſt ſimple law or principle of Motion, which is generally obſerved in the conſtitution of the univerſe, is that of Gravitation. We ſhall not at preſent enquire into the moſt minute circumſtances of this law of nature, it will be ſufficient for us to demonſtrate that ſomething more than Matter is neceſſary in its production, and that whenever we ſee it exerted, ſome ſpiritual agent is employed for that purpoſe. It is an action that is very univerſally obſerved, and upon this account may very poſſibly be brought under the cognizance of common-ſenſe. By this deciſion let us endeavour, if poſſible, to determine the truth of our poſition, upon as good a foundation as if ſupported by philoſophy. When philoſophers ſpeak of Gravitation, they intend only the contemplation of that

certain

certain and invariable law that is eſtabliſhed between different parts of Matter; but do not in the leaſt ſatisfy us with regard to the powers that cauſe it, or demonſtrate to us where it exiſts. But the vulgar look more to the cauſe, and diſregard the extent of this principle. Beſides, thoſe philoſophers, who have attended to this, led on more by abſtract reaſoning, than the information of their ſenſes; whenever they have attempted to aſſign a cauſe, have affixed it to that which cannot poſſibly exiſt in ſuch a relation, by endeavouring to find it in the body acted upon, rather than in that which ſeems to act upon the other. Thus for inſtance in the law of Gravitation, our preſent object; it has been always imagined that there exiſted in the larger body, a power that attracted the leſſer to it, rather than a power in the ſmaller which impelled it to the more conſiderable. It is not to our purpoſe to attempt a philoſophical confutation of this error; we ſhall truſt to the eyes of the vulgar, who obſerve it in a more natural

natural view, and principally attending to the cauſe, find it in its true place, and where alone it can poſſibly exiſt. The experience that they derive from the actions of themſelves, and the reſt of mankind, informs them that moſt bodies are only moved by their own immediate agency, and from hence they are convinced whenever they obſerve one of their fellow creatures moving any part of matter towards another, that the power of motion reſides in the man who moves the body, and not in that body towards which it is moved. From hence it happens, that when they ſee a ball fall out of their hand to the ground, it is more eaſy to infer that there is a force *ab extra* belonging to that body, which impels it to the earth, than that there is a power inherent in the earth which attracts it to itſelf. This will be more evident perhaps if we conſider how we feel ourſelves upon a review of the powers of Electricity and Magnetiſm. That power which ſeems to attract, appears forced,

unnatural

unnatural and inconſiſtent; whilſt the repelling power carries with it more of a natural, eaſy and agreeable appearance. We are accuſtomed to the one, as I have ſaid, from the general actions of human nature, to which the other ſeems abſolutely contradictory, and in conſequence of that, unnatural. It may be obſerved that by the ſame powers by which we drive bodies from us, we ſeem likewiſe to attract them to us; and if we conſider theſe actions aright, we ſhall find that they are all of the former kind, and that the power by which bodies are attracted towards us is by an Impulſion from the center of Motion, of thoſe inſtruments which are employed for this purpoſe *.

FROM

* All the inſtruments of Motion in our bodies are levers, which are all acted upon by one ſimple piece of mechaniſm, viz. the contraction of the muſcles, and the difference of impelling and attracting depends only on the ſituation in which the muſcles are placed upon the bones; the former being placed on one ſide and the latter on the other: By this they obtain the

FROM the imaginary idea of the cauſe of Gravitation in bodies, which philoſophers entertained, aroſe not only the character, but the appellation of it as an attractive power, and it was called the Attraction of Gravitation. A name which is liable to great cenſure, as inconſiſtent with the propriety of denominating things, and as not philoſophically characteriſtic. Gravitation implies a law or power in the active body, Attraction in the paſſive one. If the acting body is made to move by its own Gravity or Weight, there is no neceſſity for an Attraction; and if it acts by Attraction, there is no neceſſity for Gravitation.

diſtinguiſhing names of Flexors and Reflexors, but they have both the ſame fulcrum, and always impel from the center of Motion. To give an inſtance of each of theſe actions; if I ſtrike a blow with my hand, I contract the Reflexor muſcles of my arm, which ſtretch it out to its full length and raiſe the lever one way; but if I draw any thing towards me, I contract then the Flexor muſcles, and raiſe the lever in the contrary direction.

tion. Certainly one power of action is ſufficient, at leaſt it is more ſimple, and more conſiſtent with the general Tenor of the Divine Laws. This diſtinction was probably inſtituted to diſtinguiſh this Attraction of Gravitation, from other exerciſes of that power; but if it was an Attraction, would it not have been better to have diſtinguiſhed it by its real difference, than by a term that diſqualifies it from any relation.

WE now proceed to another kind of Attraction, viz. of Coheſion or Adheſion. Let us examine a little into this other grand law of Nature, and ſee whether it can with any juſtice be determined to be a ſpecies of Attraction. Philoſophers have indeed decided this queſtion in the affirmative, but to the eye of common-ſenſe, it is no more evident than was the law of Gravitation. We have no original idea of Bodies being kept in contact, but from the obſervation of our own actions; and this acquaints us

that they remain ſo, only whilſt we operate upon them, or fix and entangle them in ſuch a manner as that they cannot poſſibly be diſengaged; but upon that ceaſing, we ſee them entirely removed from each other, and the law become void. From this circumſtance it is, that we very naturally reaſon upon other bodies which we ſee in ſimilar ſituations, and imagine that they muſt be kept there rather by ſome unſeen intelligent Cauſe, which acts *ab extra* upon them, than that an attractive power ſhould really reſide in the bodies themſelves to keep them in contact.

THIS power or law of Nature, which may more properly be called the Attraction of Adheſion, is very extenſive throughout Nature, is eſteemed the Ground-work of that philoſophy, which treats of the particular qualities of Bodies, and has a great ſhare in what relates to the general nature of them: But every law of Nature cannot be explained by that of Attraction, if any

will

will admit of this explication, when conſidered in a juſt light, and viewed not only with the eye of common-ſenſe, but alſo of reaſon and genuine Philoſophy. Electricity, Magnetiſm, the common Elaſticity of many bodies, particularly the Air, and the repelling influence of many parts of Matter, may convince us that another principle diametrically oppoſite to the former does prevail, and has a very conſiderable influence in the operations of Nature.

SECT. II.

Of the Law of Repulſion.

IN the uſual and common face of Nature, Bodies are always either joined together in their diſtinct parts, or ſeparated from each other; which gives riſe to a particular diſpoſition by which they are inclined to either of theſe ſtates. The diſpoſition to adhere together, we have already conſidered, let us now examine a lit-

tle into the oppoſite ſtate by which bodies already adhering, are diſpoſed to ſeparate and become diſtinct; or if they are already ſeparated, to continue ſo, and reſiſt all approaches to each other, and to become united. The principle upon which this is founded, is called the Law of Repulſion, and is what we every day obſerve; for there is no law of Nature that we meet with more frequently. The aſcent of Vapours and the elaſticity of metallic Springs ſeem to aſſure us of its exiſtence, almoſt as certain as any other law that reigns in the univerſe. The reaſon of this is, becauſe every one muſt, and cannot avoid obſerving theſe effects. But experiment and more acute obſervation, convey to us an infinite fund of examples of this principle. The vulgar eye ſees it, and cannot refuſe its aſſent: but the Philoſopher, I mean the experimental as well as the mechanical, proves, demonſtrates and confirms it. It is no where more evident than in the power of the Air, a body we are ſo intimately acquainted

quainted with; and which exactly anſwers the idea we have given of this law, by continually expanding itſelf of its own accord, wherever it can meet with room, and reſiſting every offer that is made to condenſe it.

THUS it is ſeen in that ſimple Element which we all know, and upon which the mechanic exerciſes his profeſſion; but further reſearches into the intimate nature of many parts of Matter, and an experimental enquiry into their moſt minute particles and qualities, have very much enlarged and extended our views upon this ſubject. By theſe we have ſeen that an apparent quality, circumſtance or affection, induced upon them, ſuch as heat, will cauſe this law of Repulſion univerſally to take place, and deſtroy all tendency to attraction. If then, by this ſingle circumſtance, all the powers of Nature ſhall become changed, and acknowledge one ſimple univerſal principle, Gravitation loſe

its Gravity, and Attraction become repellent; it is worth our while to enquire into the reaſon of theſe phænomena, and ſee upon what principles bodies are influenced in ſuch a manner.

WE ſhall begin in this conſideration with a propoſition, which although it may ſeem ſtrange and unaccountable, and want abundance of proof, yet we hope to confirm it by rational arguments. It is this, that Matter does not primarily act as material ſubſtance, but is influenced by ſome obſcure inviſible contrivance to perform its Motions, in the ſame manner as our bodies are not operated upon ſolely by mechanical principles, but owe their action to a different power. In order to prove this more clearly, let us premiſe that the contrary opinion has been owing to an error, that unavoidably has crept into a philoſophy, ſo mechanical as ours has been.

WE have been too apt to think that the action of material ſubſtances upon one another hath been always in proportion to the reſiſtance that is given, or that the power of moving of bodies is determined by their denſity. This is true in general, with regard to moſt kinds of Matter in their natural ſtate, and as they are offered to our obſervation; but it is by no means an univerſal principle; the action of winds, the action of common elaſtic air, and the action of vapours, may be excluded from this general rule. Sir Iſaac Newton himſelf, who made ſuch notable diſcoveries, with regard to the powers of Attraction and Gravitation; yet entertained many conjectures concerning the means by which they took place, or by which bodies firſt began to move. But what he imagined, could never admit of mechanical reaſoning, and upon this account was not admitted as juſt. It was not however leſs true for that reaſon. It was beyond the enquiry of mathematics, and experiment was the only teſt

teſt of its truth. More modern philoſophers, who have taken up the ſtudy in this train, may have made great diſcoveries in this particular. We ſhall attempt no more then, than by detailing their ſentiments, to elucidate this point; which we hope to do without injuring the importance of genuine reaſoning, or invalidating the real nature of the truth*.

* In the whole of this we muſt acknowledge the merit that is due to ſo ingenious a profeſſor as Doctor Cullen of Edinburgh, who in his chemical lectures has thrown ſuch admirable lights upon this ſubject. And we muſt always ſincerely wiſh that his diſcourſes on the Matter of Fire were made public, not only as a piece of inſtruction, which the good of mankind demands from him, but as a confirmation of our ſentiments.

SECT.

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SECT. III.

Of the more minute principles by which the Law of Repulſion takes place, the Ether of Sir Iſaac Newton, and the Matter of Fire.

WE have already ſeen, that of all the Laws of Nature, Repulſion is that which moſt univerſally prevails; when the parts of Matter are brought into peculiar circumſtances and influenced by a particular affection, viz. that of Fire or Heat. But we may now go a little further, and advance that all bodies, even in the natural ſtate in which we find them, are always influenced by the ſame rule, that Repulſion is the original ſtate of Nature, and that the laws of Gravitation and Attraction are dependent upon it. We advanced very boldly when we alledged that Matter did not act as Matter or according to its denſity; but then we had not conſidered this principle

as

as univerſal; but if that can be confirmed, then it will want no proof, that the action of bodies depends not upon their denſity. There can be nothing more ſimple than the action of the air, and yet nothing more evident, than that this does not depend upon the quantity of Matter contained in it; for one bubble of this element compreſſed in the condenſing engine will equally reſiſt the force that is made upon it, as what would fill an immenſe ſpace. The ſame may be ſaid of vapour, if an engine could be contrived ſo cloſe, as not to admit the leaſt bubble to eſcape from it. It is the ſpring, the elaſtic and repelling force, that muſt occaſion this vaſt power and effect, which ſeem ſo exceeding ſtrange and wonderful. If we ſuppoſe bodies to act by their denſity, this repellent ſtate can never take place; for by their denſity muſt be underſtood the quantity of Matter contained in them; and, on the contrary, if we imagine that this ſtate of Repulſion is univerſal, then bodies can never act by their denſity,

denſity, or the quantity of Matter. This is not intended to deſtroy thoſe notions that are ſo univerſally approved of, with regard to the moving powers of bodies; becauſe I think they may be explained from another principle, and becauſe it is irrational to conclude that bodies begin to act juſt in the manner in which we ſee them. We are not diſputing about the mere action itſelf, but about the firſt motions which take place in Matter. Sir Iſaac Newton, as we obſerved before, was hardly content with the mathematical reaſonings upon Gravitation and Attraction; nor could he be brought to think that they were primary actions, but he ſought for ſomething further, to give riſe to theſe motions. He imagined that there was a ſubtile Ether, or Medium which not only *pervaded* but *ſurrounded* all bodies, and that it was by means of this that all their motions were originally ſet forward. This conjecture was certainly the effect of juſt reaſoning, and argued as much the elegance of his genius; as his other diſcoveries

coveries diſplay the ſoundneſs of his judgment. There is nothing inconſiſtent in this ſuppoſition of an Ether, by which bodies are primarily induced to action. It may admit of a very probable conjecture, not only from the viſible effects that are produced, but from the analogy of human nature. We cannot immediately act upon our bodies, though we poſſeſs a ſpiritual agent, but all our actions are brought about by a medium between our ſouls, and the more corporeal parts of our nature. Why ſhould not then ſuperior agents, as they poſſeſs the ſame power, require ſome ſuch means to execute their purpoſe. And this is ſo far from depreciating their nature, that it highly exalts it, by giving the greater ſimplicity to their motions. But prior to this conſideration, let us endeavour to demonſtrate the exiſtence of ſuch an Ether, and prove its influence upon material ſubſtances.

WE have already ſeen that all bodies are capable of being brought into a ſtate of Repulſion, and that this is effected by the influence of Fire. Let us then examine into the nature of the matter of Fire, and ſee if it is not capable, by the power which it enjoys, of becoming a proper medium between bodies, and anſwering to all the properties of the univerſal Ether. This element has always been obſerved with wonder and aſtoniſhment, from the firſt ages of the world. The ignorant adored it as an emanation of Divinity, and philoſophy made it a principle in the conſtitution of the univerſe. But it is the latter ages of philoſophy, that have paid the greateſt attention to it, and enhanced its value. And this has been, not becauſe they always conſidered it aright, but becauſe they deviated from former rules, opened a door to further conſideration, and gave a ſcope to a general enquiry.

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BOERHAAVE was the first perhaps who reduced it to a system, and his sentiments are now the most universally prevailing. But his enquiry was only upon the verge, and he took notice of it only in its external form. Thus he resolved it into a mere affection, or circumstance of Matter, occasioned by an intestine motion that might arise in the different parts of it; from which he further adduced this proposition, that it arose in proportion to the density of the bodies in which it was excited. All this is indeed fact, that from motion heat must necessarily arise or be generated, and that the greater the density of any body is, the more motion will be occasioned, and of consequence greater heat. But then, abstracted from the body this is nothing, and it is inconsistent to make such an affection or circumstance of bodies capable of affecting us like a substance. How inconceivable is this to the common capacities of mankind. If we are hurt or injured by this

this element, when not in contact with any body, we can hardly ever diſpoſe ourſelves to think, that this is owing to the inteſtine motion of a body at a diſtance from us; but we much more eaſily conclude, and indeed always imagine, that it is ſome ſubſtance that affects us.

BUT beſides this, it is evident to our ſenſes, that there is ſomething flowing from theſe bodies on fire, that pervades others, alters their properties, and reduces them to a different form. Two bodies ſhall be put together, neither of which are the leaſt affected with heat; this affection ſhall immediately ariſe between them, and they ſhall be changed into a new ſubſtance*. The heat that is already generated in a body, as in charcoal, ſhall be applied to

* This is the cauſe too of all fermentable ſubſtances in which Heat is ſpontaneouſly generated, they are changed into a body different in its properties to every appearance, and in its effects upon the human ſyſtem.

another, as a metallic ore, and that ſhall be changed into a third as unlike the former as any two that can be imagined†. Can mere Motion affect all this, without the aid of any ſubſtance? I ſhould think not: But let it be granted to be ſo; and then I would aſk, what gave riſe to this Motion, for it muſt certainly ariſe from ſomething. If it be ſaid that it ariſes from heat, then heat is a body, or elſe it is the Motion itſelf which is the cauſe of its own Motion. Beſides, if heat is only a quality, we may obſerve then that a quality can give Motion; and if it can give Motion, why not the Motion of the univerſe. To what a dangerous precipice will ſuch reaſoning as this bring us; and what room will it give a Sceptic to glory in his principles, when

† The ores of metals are very different from the metal itſelf; as having no malleability, the grand property of theſe ſubſtances. This is given to them by interpoſing layers of charcoal, which when ſet on fire, yield ſome unknown ſubſtance which gives this property.

when we ourſelves reduce the whole exiſtence of ſubſtances to a quality or mere affection.

IT is the moſt probable opinion, that there is a Matter or Subſtance in Fire, and that Motion is no more than the form by which it appears, and is made evident to our ſenſes, and by which it is enabled to act upon other parts of Matter. If then it is granted to be a ſubſtance, it muſt be the moſt active and the moſt ſubtile of any we are acquainted with; and it muſt be univerſal and exiſt in all bodies, becauſe they are all capable of having it evolved from them. Notwithſtanding this, it muſt be conſidered as ſimple, inoffenſive and innocent, except when rouſed to act, and then it becomes the moſt violent and repulſive. Nothing can withſtand its influence or allay its force.

WE have found then a Matter univerſal in all bodies, which is conſtantly repellent,

and diſpoſed to exerciſe this power; but which is moſt commonly kept down and reſtrained from action, and that whenever we ſee it, in conſequence of this, it is furious and outrageous. But we muſt now in ſome meaſure loſe the laſt idea of it, and conſider it only as univerſally active. By this means, we hope we ſhall in ſome manner, be able to account for many of the phænomena of nature from its influence.

SECT. IV.

Of the means by which this Principle may act in influencing Gravitation, &c.

WE ſhall begin with aceounting for the general Principle of Attraction, from this univerſal repellent active Matter which we diſcover in nature. Attraction, we have already intimated, is an apparent tendency that bodies have to approach each other

other and become conjoined. This can take place no otherwiſe than by a force exerted upon them *ab extra*, or an internal principle in their own nature. If we appeal to the decree of our common conceptions of things, the former will certainly appear more natural and eaſy than the latter. But not to truſt to a deciſion that may be built upon fancy, and exclude juſt reaſoning, let us try it by the teſt of philoſophy.

IN order to prove the poſſibility of it, we muſt beg the favour of this ſuppoſition; that the whole univerſe is full of a repellent Matter, or that any particular part is completely filled with it, and the connection with any other is entirely ſtopped. Suppoſe then, that this repellent Matter, by any force or energy exerted upon it, or by being let looſe from its hold, is excited to Motion. If this Motion was univerſal, all the repellent Matter would be excited to this affection, and be driven in the ſame

direction *ad infinitum*. But if it met with any reſiſtance from inactive bodies, or thoſe that were moved had not a power to communicate to others the ſame degree of Motion, all which circumſtances muſt neceſſarily happen in the ſtate in which we have placed it; then that part of Matter which moved towards the other part, which is paſſive, would ſeem to be attracted by it; but in reality would be only driven towards the other with a force too great for it to repel or drive back. Let us ſuppoſe, for example, a ſeries of ſpherical bodies all repelling each other, and whoſe original force of Repulſion, when put into action, would be the ſame; one of theſe bodies is ſet in Motion with double of its original power, and the other acting againſt it but with half that force, cannot repel, but muſt ſubmit to its influence, and in this caſe, ſeem to attract it towards it: So that here the repellent Matter itſelf would become paſſive, inactive and attractive, where it did not acknowledge the immediate agency of

ſome higher cauſe. And thus we ſee, that although bodies may be ſaid to be always in a ſtate in which they may repel each other, yet when a ſuperior force of Repulſion acts upon them, then they put on the form of an Attraction. The ſame reaſoning will hold good not only with regard to their producing a ſimple Attraction, but likewiſe in order to keep them in that ſtate of adherence and contact, which would otherwiſe ſeem to be a confirmation of that power.

BUT to be more particular, let us now endeavour to explain ſome of the particular Attractions, that may be obſerved in nature, and of which we have already taken ſome degree of notice.

AND firſt, let us conſider the Law of Gravitation, and ſee if this cannot be explained from the foregoing principles: A body is let fall from my hand, and it immediately approaches the earth; this body

is poſſeſſed of a great quantity of repelling Matter, both in its ſubſtance and in what continually ſurrounds it. This Matter is put into an inteſtine Motion by my hand, and although that action is ſo ſmall as can ſcarce be perceived, yet we have no notion how inconſiderable a force is required to excite the power of this repelling ſubſtance. The body thus put in motion, overcomes entirely the repelling force of the air, and thus falls down to the ground, and puts on the appearance of an Attraction to the earth*.

The Attraction of Cohefion and Adheſion may be explained in the ſame manner. The moſt ſimple of this kind is that of Capillary Tubes, in which fluids purſue a courſe directly contrary to their gravity, and are attracted to a body to which they have no

* Perhaps this ſentiment will admit of ſome degree of confirmation from the doctrine of Pendulums; where the force of Attraction does not immediately take place, but is determined by the force of vibration excited in the body.

no relation. This may be explained in a very ſimple manner, from this doctrine of a repelling Matter: For if we can ſuppoſe its exiſtence at all, it muſt be in its greateſt perfection where it is moſt divided, and diveſted of what is merely material: And there it is that this law does moſt evidently take place. In this inſtance it muſt not be conſidered, even as an apparent Attraction in the tubes of Glaſs, but rather as an example of the free exerciſe of Repulſion in the Matter contained in them. Fluids are infinitely more ſubtile than Solids, and Water is the moſt ſo of any of them that we know; ſo that it is no wonder it ſhould ſeem moſt evident in that ſubſtance.

I need not mention the peculiar Attractions which ſeem to be made from choice, by particular bodies with each other. For they not only evince this fact in the higheſt degree, but are very perfect inſtances, upon which we might rationally form the idea. It would be too tedious to enter

enter into a particular diſcuſſion of them, neither is the preſent philoſophy mature enough to deduce the conſequence from it, but in all the affections of this kind we ſee a very active Matter produced, and perhaps determining all theſe effects.

THESE obſervations will more particularly agree with thoſe phænomena, that have been obſerved in Magnetiſm and Electricity. The laws that take place in bodies affected by them, are quite different from the common ones, that are attributed to Matter, although they have never been reduced to any juſt or even plauſible theory. The whole of what we have advanced, is only an illuſtration taken from them. For in theſe we ſee the circumſtances as we have taken notice of, more fully and clearly elucidated. A Repulſion and Attraction independent of Matter or the laws of it; ariſing from ſome obſcure unintelligible cauſe, and adapting themſelves to peculiar parts rather than the general forms of material ſubſtances.

ſtances. If that ſubject was more enlightened than it is, ours perhaps might carry with it more the appearance of truth. We hope therefore that it is daily approaching to a criſis; and then, that what we have advanced only as conjecture, may ſtand upon a firm and ſtable foundation.

SECT. V.

Of the final Cauſe of a general repulſive Principle in Matter.

WE have not, without ſome degree of juſtice, complained of the deficiency of experiments, to aſcertain a truth of ſuch infinite importance: We muſt beg leave therefore to appeal to another quarter, for arguments to ſupport it; and although any thing of metaphyſics may be ſo much decried in determining facts, yet we hope in this caſe to derive ſome ſatisfaction from that ſource. To enquire into the final cauſe

cauſe of this repulſive power, to examine more particularly into the ſcheme of Providence as it preſides over Matter, and what is more properly our buſineſs in this affair, to explain how it produces the great revolutions of the univerſe; have ſufficient motives in themſelves to induce us to this diſquiſition. The more ſimple the ways of Providence or any ſpiritual Beings are conceived, the higher it proclaims their qualities, and carries the greater degree of probability. No one will pretend to deny, but that there certainly muſt be the greateſt ſimplicity in the works of God, although we are not always ſo happy as to diſcover it; and notwithſtanding in our reſearches after truth, we find them connected with a very complex ſyſtem, involved in many hidden and myſterious circumſtances, and often independent of any foreſeen cauſe, yet, the mind of man always labours at ſimplicity, and the more clear and plauſible a ſyſtem it can eſtabliſh upon this foundation, the more eaſily it ſatisfies itſelf, and obtains the approbation

probation of the reſt of mankind. The great excellency of Sir Iſaac Newton lay in this particular, and if he could have proved his conjectures as ſatisfactorily as he did his mathematical truths, he would have rendered his diſcoveries infinitely more perfect than they were; and they would as much more have exceeded what he did diſcover, as that excelled the previous knowledge of mankind.

MANY authors, and even his own diſciples ſince his day, have either neglected the conjectures at the end of his optics, or have objected to them as frivolous and of no uſe, or have even taken the pains to ſupport a mathematical reaſoning againſt them. For they ſay, it is only extending the ſtep of an infinite problem a little further, which at laſt muſt terminate in one point, viz. the infinite power of *God Almighty*. I muſt beg leave to differ from theſe gentlemen, as I cannot ſee the force of their objection. For if this philoſopher could have purſued his reſearches a little further,

they

they would not only have carried on the problem, but would have enforced the power of one ſimple, general, ſtated rule, whereas, as the caſe ſtood, he was obliged to admit of ſeveral diſtinct from each other; operating not only independently, but alſo in oppoſite directions. This was not only true, as it reſpected the fact, but the mind alſo tending to diſcover ſomething more, muſt be diſſatisfied with itſelf, and thus make his ſyſtem appear leſs perfect even to his own judgment.

BUT beſides, from laws ſo oppoſite to each other as thoſe were conceived, it was not eaſy to ſuppoſe the immediate Action of the Deity upon Matter. It might be thought derogatory to his perfections, that he ſhould conſtantly intermingle himſelf with human affairs; and condeſcend to tranſact ſuch minute and trifling actions, as we ſee brought about upon by the force of Gravity and Attraction. From this it was that this notion was eſtabliſhed; that

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ſtated invariable rules were inſtituted at the creation, by which theſe laws took place of themſelves, and were not induced, by the immediate hand of Providence. We hope we have already ſhewn that his Preſence is neceſſary to every exertion of his power, or otherwiſe that Matter muſt act of itſelf. From hence then this opinion will naturally flow, that the moſt probable means, by which he exerts that power, muſt be thoſe which we imagine the moſt ſimple, and by which his action can moſt eaſily be inforced. This will very probably be acknowledged to be in that manner, which we have already deſcribed. That the univerſe is full of an etherial ſubſtance, by which, as a Medium, every revolution of Matter may be conveyed to the ſupreme Mind, and every action of the univerſe be performed: That this pervades and ſurrounds all bodies, and that all the circumſtances of their particular nature are brought about by the agitations of this repulſive

Matter,

Matter, induced to motion by ſome ſpiritual Agent.

THESE ſentiments will admit of a further proof, if we draw an analogy between theſe Motions, and the common actions of animal beings. We ſee in them, a particular form and conſtruction neceſſary to every action that they obtain. We ſee likewiſe a peculiar general mode eſtabliſhed for their Action, to which all mechanical ends are made ſubſervient, viz. by impelling from the center of Motion. We may obſerve likewiſe a means inadequate to a mechanical end, in the nervous ſyſtem, by which every Motion is brought about, whenever the mind chuſes to act. Let us now endeavour to form the analogy between theſe Motions and the great Laws of Nature.

THE firſt inſtance indeed will hardly bear any compariſon. We do not ſee the Motions of Matter much dependent upon form,

form, or peculiar conſtruction of parts. But this perhaps is owing to a defect in our own ſenſes, we have not the means to diſcover what variety of forms may be in heavenly bodies, which ſhall adapt them to Motions different from what we ſee Matter influenced by here on earth. There is one inſtance in which we may ſee an apparent diverſity, not in the law indeed, but in the method by which it is brought about, and that is in the revolution of Comets. The circulation of ſuch a body, and that of a Planet may owe their difference, perhaps, to circumſtances of form, as much as that of the ſap of vegetable and the blood of animal bodies. In this, however, a difference muſt be taken notice of, which deſtroys entirely all analogy. Animated bodies, as they differ in ſtructure, differ in the mind that ſuperintends them; but the laws of Matter moſt probably are influenced by one mind, and one agent that directs all their Actions.

BUT we purſue the analogy to the ſecond inſtance, viz. the Mode or Form by which muſcular Motion and the Motions of Matter are performed. The former, as we have ſaid, is by an impelling or repelling Power from the center of Motion, by which as the primum mobile, it directs all its other Motions, as caſting bodies from it in every direction, and likewiſe drawing them to, and attracting them towards it. The latter is influenced too, much in the ſame way; for the laws of Gravitation and Attraction, as we have before obſerved, may be, and hence it is eaſy to infer, that they are operated upon, originally by a repulſive principle of Matter.

BUT the analogy will perhaps be the moſt conſpicuous in the third inſtance that we mentioned, viz. in the means by which Motion is originally begun in the Matter that is firſt acted upon by Spirit. This is the nervous power of Animals in one caſe, and the Ether of Sir Iſaac New-

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ton in the other; both of which, if conſidered in a mechanical view, are entirely inadequate to the end propoſed. This indeed has favoured the objections of mechanical reaſoners againſt the influence of the Etherial ſubſtance. But I think the analogy between theſe ſubſtances is ſo ſtrong, that it is a very great confirmation of the fact, without the aſſiſtance of mathematics. Whether an Ether of this kind prevails in animal bodies has been a doubt made by ſome; how far this is true, we ſhall not examine at preſent, but haſten to obſerve: That it will ſtrengthen very much our notions, concerning the influence of a ſpiritual ſubſtance in the Motions of Matter: And that as a perpetual agency, which directs and governs every Action in the one, is abſolutely neceſſary to its exiſtence, ſo we may infer that the ſame relation is no leſs to be ſuſtained by the ſame means in the other.

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CHAP. III.

Of VEGETABLES.

SECT. I.

Of the general diſtinguiſhing Marks of this Claſs of Beings.

HAVING delivered our ſentiments with regard to the methods, by which the laws of Matter in general are performed; we ſhall now proceed to enquire into the Motions of more particular parts, and obſerve wherein conſiſts the difference, both of the Action itſelf, and of the Agent or Being which induces it. And firſt, let us examine a little the vegetable Syſtem, and inveſtigate the nature and properties of that Tribe of Beings that com-

compoſe it. Subſtances indeed, which cannot properly be conſidered as a middle Life between the general Motions of Matter, and the more truly animated Syſtem; but muſt be viewed in this light, as the firſt, though loweſt of thoſe beings that acknowledge a diſtinct organization, or are influenced in their Motions by a peculiar conſtruction of parts.

WHATEVER view we take of this ſubject, we ſhall find it replete with ſufficient Matter to convince us, that the hand of Providence preſides and governs likewiſe in this part of the univerſe. But then it does not act by ſuch an immediate influence, ſuch a diſtinct and uninterrupted authority, and by ſuch a ſole and undivided agency. A Vegetable muſt always be conſidered as a different kind of Matter from that which we have already reviewed. It partakes indeed of all the general properties which that enjoys, and which we have already deſcribed. It is poſſeſſed of Solidity and Ex-

tenſion, thoſe general ſtandards, by which Matter is diſtinguiſhed from Spirit. It acknowledges the influence of Gravity and Attraction, thoſe principles, which we obſerve as common to material bodies. And when viewed in a tranſient manner, merely as an exiſtent body, diſcovers only thoſe properties that every other thing enjoys that ſurrounds us. But if we make a nearer inſpection into it, and review it for ſome time of its paſt exiſtence, we ſhall find that it poſſeſſes many properties, and is to be diſtinguiſhed by many affections, which Matter never can nor has been obſerved in the leaſt degree to partake of.

IT muſt from hence then be conſidered as a ſeparate being, and as influenced by different cauſes. We ſhall aſſume the term Life, as the idea that forms this diſtinction between them; and this muſt neceſſarily be founded upon a ſuppoſition, that they are actuated by different ſpiritual Agents, and that the Spirit, which directs the Motions

tions of Matter in general, affects this Claſs of Beings not in an immediate, but in a ſecondary manner. The general affections of Matter are ſo univerſal, and we are acquainted with ſo little variety in the general principles from which they proceed, that however they may be influenced, it has never been thought proper to apply, even in imagination, the term of Life to them. The more obvious reaſon of this ſeems to be, that we have never been able to obſerve any revolutions to have happened in them, which deſtroyed their properties. We view only parts of the ſyſtem, and though theſe ſhould fail, yet it is only like the amputation of an animal limb, which takes away Life only from the part affected, but does not deſtroy that of the whole machine. But this is not the caſe in the animal and vegetable tribes, where we can perceive the whole of their power and the extent of their exiſtence. Theſe we ſee at one time acting by certain principles and laws, loſing them in a very ſudden manner, and becom-

ing devoid of every thing but what we ſee Matter in general enjoy.

UPON this then there might be ground, perhaps, to eſtabliſh the diſtinction between Matter in general and the vegetable conſtitution. But let us examine the ſubject a little more particularly, in order to ſee whether the general principles, by which Matter is governed, are ſufficient to explain the different phænomena which may be obſerved in this Claſs of Beings. To this end let us firſt point out ſome of the particular inſtances in which they differ from each other.

WE have already ſeen, that Matter in general, always acts in a particular direction, whenever influenced to Motion, and that is by receding or going forward immediately from the moving power. Thus if we move a ball with our hands, it correſponds to the Motion which we give it, and moves directly forward, until it meet with

reſiſtance

reſiſtance from a paſſive body which is able to re-act upon it; or rather to prevent the extent of its Action. But Vegetables have a very different manner of acting, and notwithſtanding that we cannot ſo minutely examine into all the circumſtances of their nature, as to find that they always act differently from the general Motions of Matter, yet from analogy with thoſe we are acquainted with, we may preſume that their Action is quite in an oppoſite direction from the impulſe; and that it is moſt commonly dependent upon a reſiſting power inherent in themſelves, to repel every thing which offers to act upon them.

ANOTHER difference between the Motions of Matter in general, and the vegetable ſyſtem, may be perceived in this; that when Motion is excited in Matter, it extends no further than where a connection reigns. An objection indeed may be here alledged, with regard to muſical ſtrings, which appear to excite Motions in each other,

other, though at ſome diſtance. This at firſt view, may appear plauſible enough, but upon nearer inſpection, it will be found, that this is effected entirely by the air, which in ſuch a caſe muſt be conſidered as a medium which ſupports the connection. The ſame rule does not hold good with reſpect to Vegetables, they are often induced to action in parts very diſtant from where it firſt began, where no connection ſubſiſts between them, and where the air cannot interpoſe as a Medium in any meaſure to influence it: So that this Action ſeems to be abſolutely and entirely independent of any material affection, to which we can compare it. The moſt lively example we can adduce upon this ſubject is the ſenſitive Plant, a very beautiful and indeed a very ſtriking inſtance of the power of vegetable life.

But if we deſcend to the œconomy of Plants, I mean in their vegetation, &c. we ſhall find continual inſtances of their Motions,

tions, and theſe not only when affected by Agents, univerſally acknowledged to act under the influence of a ſoul, but alſo when actuated by material ſubſtances themſelves. This indeed we muſt conſider as a Motion, which a Plant determines for itſelf, and may have ſome right to be called ſpontaneous, and thus makes a third difference between theſe Actions and thoſe of Matter. We can almoſt always account from general principles, for thoſe Motions that we ſee actuating bodies in general, but it is not ſo in this inſtance of Plants. It has been much diſputed how it is they come to act at all, and that vegetation is performed. Let us enquire a little into this matter; and firſt, let us determine the facts upon which we ſhall proceed; the ſureſt guides of truth and infallibility. But this muſt be the deſign of the following ſection.

SECT.

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SECT. II.

Of Vegetation and the Motions of Plants.

THE judicious Dr. Hales has thrown perhaps the greateſt light upon the ſubject of Vegetation, of any author who has ever written, In this, or any other country. Grew and Duhamel laid a foundation for this enquiry; one, by an exact Anatomy, and the other, by accurate experiments on the functions of this claſs of Beings. The whole has contributed to diſcover the following facts: Firſt, That a continual abſorbtion of a nutritious Matter is conſtantly performed by a ſet of veſſels fitted and deſtined for that purpoſe. Thus by laying a Plant in water for a few days, it has been obſerved, that the whole of the water ſhall be drawn off through theſe veſſels in a very expeditious manner, and this much more conſiderably, than if it had been done by the

the ſun, or exhalations by any other means; and yet that the Vegetable itſelf ſhall not be by any means ſur-charged with it, as would infallibly happen to any material ſubſtance, as an abſorbent earth, or any thing elſe that operates in that manner. Theſe ſubſtances, act only by their porous texture, which occaſions what is called an Attraction of Coheſion, and can operate only on a particular quantity, like Capillary Tubes, which muſt always emit what they cannot bear to attract. But it is very different in Vegetables, for they not only continue to imbibe a very large quantity, but, ſecondly, They are nouriſhed, enlarged, and protected by it, parts that are concealed are developed, and the figure is entirely altered, and becomes very different from what it was at its firſt appearance. This as the end brought about by the other as a means, would be ſufficient to convince us of ſomething different from Matter without any other proof; but it will be more clearly and fully elucidated when we come

come to conſider, that this is often effected, in the third place, by peculiar kinds of Matter. When we operate with material ſubſtances, we find indeed that peculiar ſorts are effected to each other, but with regard to the reſt are entirely inactive and ſluggiſh. This is what forms the elective Attractions in Matter. We do not find any thing abſolutely of this kind in Vegetables; for although they ſelect ſome particular kinds for their nouriſhment, yet they are acted upon by all, notwithſtanding each produces a different effect. They act too upon theſe beings in a very different manner, from what they do on Matter in general, not by deſtroying their properties as in the caſe of elective Attraction, but by keeping up and preſerving thoſe properties entire, whilſt they endeavour to throw off the offending cauſe. All Plants are ſaid to have their peculiar food, which haſtens the progreſs of their vegetation. Theſe they ſelect from different kinds of material ſubſtances, but theſe ſubſtances do not contribute

tribute their own nature to them, but like the food of animals only preſerve them in their original ſtate. From hence it is, that nothing is more common than this obſervation; that a poiſonous and a wholeſome Vegetable ſhall both be produced from the ſame ſoil, and where the ſame food has contributed to their ſuſtenance. In the fourth place, not only thoſe parts of Matter which conſtitute the food of Vegetables, and others of that kind, excite Motions; but other bodies likewiſe, very different from theſe, contribute very much to promote their vegetation. Of theſe the Sun by its light and heat, ſeems to have a very peculiar influence, in ſo much, that perhaps there is no circumſtance that can happen to a Plant, in altering the ſtate and nature of its juices, in prolonging its growth, and keeping up the vital powers, which can be more favourable to it, than this luminary. This will be clear to every one's conceptions, if we conſider the great variety of Plants, which different climates afford over

the

the face of the globe; where the greateſt diverſities, unknown to each other, are raiſed and ſupported. This is not only the caſe, but there are an infinite number of Plants, which after all the pains that can poſſibly be taken by ſoil and cultivation, yet wanting the power of the Sun, will fade and die very quickly in a climate where they are not natives. A peculiar delicacy in this reſpect may be obſerved in Plants to determine ſomething very nice and particular in their Motions, from this cauſe. It is not the quantity of heat alone, it is not merely the expoſure to which they are directed, but there are a thouſand circumſtances beſides, which are to be attended to, in order to enable them, to receive all the influence that the rays of the Sun can give them. Beſides this, Light itſelf, without the aſſiſtance of Heat, is of the higheſt conſequence in the production of many Vegetables. Dr. Hill has ingeniouſly ſhewn the Force of this in his Eſſay on the Sleep of Plants. But what is more ſurprizing,

prizing, is, that Light in ſome Plants is deſtructive of their growth, and they never promote their vegetation ſo completely as in the dark. Whether Light is independent of Heat, or is only the fainteſt exerciſe of that power, produced by an emanation from it, we ſhall not at preſent enquire. Thus far is certain, that it is a body, and as ſuch produces a very great alteration in the nature of vegetable juices, where the degree of Heat is exceedingly ſmall, and can produce no perceptible effect. The blanching of many roots, by concealing them from the Light, a very uſeful diſcovery in gardening, and the Phænomena of the Paſſion Flower, are very evident proofs of the truth of this fact. In the fifth place, There is another circumſtance in vegetation which evinces a peculiar kind of Motion in Plants different from that of Matter, as much as any other which we have already mentioned. This is the direct oppoſite to their abſorbtion, viz. a continual perſpiration, or exit of moiſture

in a very ſurprizing degree, and this abſolutely independent of any liquor that they take into their ſubſtance. The numberleſs and judicious experiments of Dr. Hales, will be ſtanding teſtimonies to perpetuity, of the truth of this fact. That it is done by Capillary Tubes is inconſiſtent with true philoſophy, however ſtrenuous the advocates of that opinion may be to ſupport it upon this foundation. The ſurprizing velocity with which a liquor is carried through them, was never executed by mere Matter, though ever ſo porous. And beſides the influence this power has in decreaſing the weight of a Plant, the different effects it perceives from Heat and Light, or from a fine or a cloudy day, and the many accidents it is liable to undergo, which obſtruct and retard this power, are all convincing proofs, that it is a Motion peculiar to this tribe of beings, and is a diſtinguiſhing mark of their conſtitution. The great effect of Seaſons, likewiſe, in promoting this phænomenon, is ſufficiently demonſtrated by

the Vine in the bleeding ſeaſon, where a conſiderable quantity of liquid protrudes itſelf through the Vegetable in great proportion, and with vaſt velocity, but ſuddenly ſtops, and for the remainder of the year admits of no peculiar difference from other Plants. Sixthly, Dr. Hales has confirmed another fact to this purpoſe, which was before advanced by Grew, viz. that Vegetables tranſmit through their ſubſtance a large quantity of air, and this not in an inactive unelaſtic ſtate, as it enters many parts of Matter, but as of an highly repellent nature, the ſame as is carried through the lungs of our bodies by reſpiration. A Plant is not mere porous Matter, which admits accidentally of this element, but it conveys it through its ſyſtem as of conſequence to its vegetation. For this purpoſe, a peculiar ſet of veſſels are deſtined, which may eaſily be exhibited to the eye, and the exiſtence of the fluid is evident to the teſt of experiment. In the ſeventh place, we are to take notice of

a very peculiar Action of Plants, to elucidate this point, which may tend to ſhew the diſtinction upon which we inſiſt, more particularly than any other we have mentioned, as it may be conſidered much more entirely ſpontaneous, and independent of any external cauſe; I mean the generation, or propagation of the diſtinct ſpecies of this ſet of beings. This is a fact which has indeed been very much diſputed. Linnæus, the moſt eminent profeſſor of modern Botany, has adopted the opinion in its fulleſt extent, and founded his ſyſtem upon the parts ſubſervient to this mode of Action. It has been happy for the advocates of this fact, that all Plants have not been hermaphrodite. For in that caſe, the diſtinction could not eaſily have been demonſtrated, but the ſterility of a Plant of the ſame ſpecies, which was diſcovered to be a female, as was the caſe with the Palm Tree, at the Cape of Good Hope, and many others where the male has been abſent, ſeem in ſome meaſure to evince that this

doctrine

doctrine is not entirely fallacious. But beſides that immediate connection between two diſtinct Plants, as is neceſſary here, the many contrivances which the ſeed itſelf exerciſes to promote its exiſtence, the continual growth of it to a large and flouriſhing tree, the annual dropping of ſeveral parts at the approach of winter, and the revival and development of them the enſuing ſpring; are evidences of a very great ſeemingly ſpontaneous power in theſe beings, and ſuch as mere Matter is entirely unacquainted with.

HAVING ſhewn, that there really exiſts a Motion in Vegetables, diſtinct from that general one, which directs and influences mere Matter; let us try if we can determine, what it is that conſtitutes this difference between them. We muſt ſeek for the origin of it, from the cauſes which we may obſerve to bring about the Action, the motives upon which it is performed, and the means which are employed to effect it.

1. WE have ſeen that Matter is influenced by a general cauſe; but whether it is the Deity who ſuperintends the univerſe, or ſome delegate which he has deputed, to actuate this ſyſtem, we have not pretended abſolutely to determine. The ways of the Almighty are inſcrutable and paſt finding out. But ſo far as this, we are almoſt certain, that all the Motions of this world, or of Matter in general, are parts of one ſyſtem, eſtabliſhed upon certain invariable rules which want no other Motions to complete it. The cauſe or mind, which is employed in directing and preſiding over this ſyſtem, confines itſelf to thoſe rules or methods of acting; and from them alone we can determine its preſence and government. But from various and different Actions appropriated as it were to another ſyſtem, and from the laws by which they are influenced, we have reviewed a ſet of beings in ſome meaſure acting counter to the general laws of Matter. We are already prepoſſeſſed

with

with the idea, that diſtinct beings may ſubſiſt in nature independently of each other, and that the only means of diſcovering their individuality is by a review of their peculiar Actions. From theſe circumſtances then it will be eaſy to infer, that there is a diſtinct cauſe of Action in Vegetables. And as we ſee every Plant forming in itſelf a diſtinct ſyſtem, and although acting by the ſame rules, yet peculiar in the time and circumſtances of its Action, and determined by no general cauſe; we may preſume to think, that each individual has an agent or cauſe, particular to itſelf, to direct and govern its Actions.

2. LET us conſider the Motives upon which theſe Actions are performed. All the Actions of ſpiritual Beings muſt proceed from and be directed by ſome Motive. There muſt be ſome impreſſion made upon them, either from the ſuggeſtions of ſome rational intelligent Powers, or an affection received from ſome external circumſtance. All the Actions of that Being, who actu-

ates the univerſe, no doubt are influenced by the former of theſe motives. Many of the actions of human creatures, perhaps all thoſe of mere animal machines, acknowledge the latter. If we conſider very exactly the original Actions of mankind, we may find that theſe are the only motives by which ſublunary beings are inſtigated to Action; and if we examine all the active natures in the univerſe, we may diſcover that the Actions of Plants too are of this kind. We can raiſe theſe beings no higher, and if they have any Action at all, it muſt proceed from this motive, viz. ſome external impreſſions made upon their ſubſtance, and in conſequence of this, inducing a reciprocal Action.

3. LET us proceed to examine, the means which are employed, to effect the Actions of Vegetables. We have endeavoured to ſhew that the general laws of Matter, are reſolvable into one more ſimple principle, and that this takes place only by means of one particular kind of Matter, viz. the Ether

of Sir Iſaac Newton, independently of any particular formation. Whether ſuch an Ether as this pervades the conſtitution of Vegetables, and is the ſpring of their exiſtence, is very uncertain. Yet that ſomething of a repelling power actuates their Motions is evident. But there is ſomething more required to enable them to perform all thoſe which we may obſerve them undergo. This is a peculiar ſtructure and organization of parts, a diſtinct ſyſtem of veſſels adapted to tranſmit fluids through their inmoſt nature, a diſtinct method of receiving the impreſſions of external Matter, and diſtinct powers of re-acting upon, and bringing about the various changes we may perceive in them. This mechaniſm is ſo far from favouring perfection in theſe bodies, that it is certainly highly derogatory to their nature. The Actions which ariſe from pure ſpirit, require no organs, the univerſe itſelf performs an office, which in other beings is limited and confined.

IT is not only ſtructure and organization which are neceſſary to convince us of the diſtinction, between the Actions of Vegetables, and thoſe of Matter in general; but there is a great difference with regard to their method of Action upon particular ſubſtances that offer impreſſions to them. Many parts of Matter act upon others, but in this Action they corrode and deſtroy them; but where they act upon Vegetables, they may be made the means of their greater perfection. The weight or denſity of bodies likewiſe, have a peculiar influence in the general Actions of Matter, and upon them the mechanical laws are founded. But they have no power over the vegetable ſyſtem. Bodies, which make an impreſſion on it, muſt be endued with ſome degree of ſtimulus, or a power which makes them peculiarly active, with regard to that conſtitution, independently of mechaniſm or any of its laws.

WE hope then, we have in ſome meaſure, proved from the foregoing, that a Plant or Vegetable conſtitutes a diſtinct ſpecies of beings, performing various Motions of which Matter is incapable, influenced by different cauſes, acting upon different motives, and performing Motions by a peculiar and diſtinct means. But there are many circumſtances, beſides what have been mentioned, which may contribute to ſupport this truth, particularly one, which can eſcape no obſervation. I mean its being fixed to the ground, from which, if you remove it, you deſtroy its exiſtence.

AN objection may be raiſed againſt what we have advanced, upon this foundation; that perception is not diſtinguiſhable in this tribe of beings, and yet that our notions require ſuch a faculty. It muſt be confeſſed, that this throws a great difficulty in our way, and which is not eaſily to be ſurmounted. In anſwer to it, we alledge

that there certainly is in Vegetables a power by which they are raiſed from ſeed, and nouriſhed and protected during their exiſtence; and when by any unforeſeen cauſes, this power ſhall deſert them, they fade away and die. Since then, by this power, all theſe Actions are performed, I ſhould be glad to know why we cannot underſtand that perception is neceſſary to it. If by perception, indeed, is meant conſciouſneſs, it will be difficult to ſhew the exiſtence of ſuch a faculty; but we hope, hereafter to ſhew that conſciouſneſs is not neceſſary to every exertion of mental powers. We ſhall therefore give a ſofter term to this faculty in Plants, and call it Irritation, which ſignifies no more than a capacity of receiving impreſſions from other parts of Matter, and in conſequence of that, inducing an Action in their own ſyſtem. By this indeed, and in every fact which is known in Vegetation, they very nearly reſemble animal nature. This analogy has been thought ſo ſtrong and apparent, that Naturaliſts

turaliſts have been in doubt where to limit the diſtinction between the two ſyſtems. The eſpouſers of each have ſuppoſed the exiſtence of many ſpecies in either tribe to belong to their favourite; and every age of the world, has preſented to us different diviſions of theſe beings.

IT is the pride of mankind, which endeavours to exalt its own nature, and ſcreen itſelf from that impotency, which this claſs ſeems to poſſeſs, which could ever ſuggeſt a diſtinction, further than the particular qualities of individuals would enforce. But I can ſee no reaſon why I may not be ranked with that tribe of beings which includes a Roſe, as with that which contains an Oyſter, or that ſimple being a Polypus. The only proper and moſt natural limits of diſtinction which can be made in the works of nature, are where the firſt dawns of life appear, where we can form an abſolute difference, and where gradation of power in themſelves does not ſubſiſt. Mere Matter is

abſolutely

abſolutely different from any Vegetable. No ſtructure of peculiar parts, no organization, no ſimple animating power can be perceived, or even imagined in any parts of it. Here then it is neceſſary to ſet down the limits of diſtinction; where general Actions ceaſe, and where particular begin. This diſtinction is not founded merely upon ideal notions which can poſſibly be controverted, but carries with it the higheſt degree of ſecurity againſt cavil. Gradation can only be admitted in beings of the ſame nature in ſome reſpects, but not in thoſe which entirely differ from each other. In this caſe then, I ſee no reaſon why we may not include Vegetables in the claſs of Animals. They are all living acting beings, and influenced by cauſes which are peculiar to each individual. They are all ſuppoſed to have in themſelves one ſenſitive principle, and are indifferent to the Action of any other, except where their own is concerned and intereſted.

WE have in this ſketch, we hope then, partly inveſtigated the nature of that life which is apparent in the Vegetable conſtitution; we have ſhewn thoſe Actions in which they differ from Matter in general; and we have, in ſome meaſure, aſcertained the cauſes which over-rule and direct their Motions. Let us now aſcend a little higher and to a more important ſubject, examine into the nature of a ſcale of beings, whoſe utility is ſo evident in the world, and explain how it is that the animal world is inſtigated to Action, and to the performance of the various Motions we may obſerve continually going on in their ſyſtem.

CHAP.

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CHAP. IV.

Of ANIMALS and their MOTIONS in General.

SECT. I.

Of the Dignity of Human Nature.

THERE is no conſideration ſo important as this: Intelligence and Reaſon, though perhaps gifts, which all Animals poſſeſs, yet are very juſtly acknowledged to be predominant in one part of that tribe. It is certainly from Gradation, that the diſtinction of Animals from each other ariſes; but it is a Gradation of mental, not of bodily faculties, which diſtinguiſhes *Man* ſo much above every other ſpecies. It is a vain and proud, as well

well as inconſiſtent idea, that ſhould imagine the forms of our bodies, ſuperior to thoſe of Brutes; but there is certainly a diſtinction, to be derived from the underſtanding, which no one can cavil or ſubvert. The utility of this conſideration, together with the importance of the preſervation of human bodies, hath induced us to make that ſpecies of beings, the object of a particular review. Indeed, as it may be for their entertainment, ſo it is likewiſe for their benefit that theſe thoughts are digeſted together. If the major part then, of this Treatiſe relates to their advantage, we hope it will be no loſs to the world. And that which we have already treated, muſt be conſidered only as a prelude to what we are now to advance, and deſigned to ſupport by analogy, the extenſive power of a mental faculty, rather than as a ſettled diſcourſe upon the objects of Enquiry.

IT is a ſelf-ſufficient, if not a mean and ungenerous idea of the Creator of the

univerſe, to think we are ſo perfect as diſtinct beings, as we imagine ourſelves to be; as if the Deity intended the advantage of no other beings but ourſelves in the creation of the univerſe; and as if all Nature was ſpread out with ſo bountiful, and unlimited a hand, for the ſole benefit of a Creature, who employs his beſt faculties to diſobey him; and as if every other being was deſigned to contribute to our welfare, without partaking of any of our faculties, or enjoying any part of our happineſs. It is preſumption to declare the extent of the latter, it is unjuſt to pronounce any being devoid of the former. But Man, ſufficiently dignified by the infinite powers of his own underſtanding, is not content with thinking of his Nature as it truly is, but arrogates to himſelf abilities ſuperior to thoſe of Angels, and depreciates thoſe of other creatures to the loweſt degree of infamy. Notwithſtanding this however, he poſſeſſes a body equally imperfect, with any of thoſe creatures which he deſpiſes, and

a mind which tends rather to deſtroy than promote the exiſtence of his corporeal nature; ſo that if the Immortality of his Soul had never been revealed to him, he might have lamented his lot, as that of a very imperfect and infallible creature, rather than encouraged the idea of any great excellence or perfection. It is our buſineſs in ſome meaſure to conſider both the parts that mankind poſſeſs, their Mental and their Bodily Faculties. The connection they have with each other, the influence they enjoy in a reciprocal Action, and the neceſſary dependance by which they are ſupported, are well worth our enquiry; but theſe muſt be the ſubject of the following ſection.

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SECT. II.

Of the Connection between the Mind and the Body.

THE firſt, as well as the moſt eaſy and natural view, which we can take of an Animal Machine, is, that by which we conſider it as a compound frame. In this view, it will be found to conſiſt of a ſenſible intelligent Agent, and an inactive lifeleſs Matter. We need not inſiſt here upon any of thoſe diſtinctions, which we demonſtrated to make the difference between the Actions of Vegetables and thoſe of common Matter. We have ſufficient evidence in our own minds, to convince us, that the animal Body has a more particular power than that ſubſtance, that there is a diſtinct being which always operates upon it, and that it is ſenſible of various external impreſſions, by which it is induced to a reciprocal Action.

THIS noble faculty, which all Animals perhaps in ſome meaſure enjoy, but which is more particularly evident in the human conſtitution, has been diſtinguiſhed by the appellation of the Mind. A faculty which raiſes us to the higheſt degree of excellence; and this, becauſe it is not only, the ſimple director of human Actions, when immediately inſtigated by external motives, but becauſe it can imbibe ideas from theſe objects, which ſhall retain a future efficacy, becauſe it can revolve them over at pleaſure, form accurate judgments of what hereafter may happen, and ſuit its Action to the various circumſtances and appearances of things. In this view it is, that Philoſophers have moſt commonly conſidered its powers and abilities; as influencing our wills and directing our moral conduct. Here indeed it exhibits its influence in its fulleſt extent, and where it can never be diſputed. Our intention, will be rather to wave a conſideration ſo evident, and to

attend more to what is not ſo conſpicuous. In this we hope to evince, that the whole power of the Mind is not taken up with theſe Motions alone, but that every Action which we obſerve to be performed by the human Body, as well as thoſe that depend upon the will, are produced by a part of that general faculty, and a mental cauſe.

THIS has been very much diſputed by many Phyſicians; either thoſe who have adopted the principles of the mechanical ſchool, or have appropriated ſome peculiar material cauſe, to perform many Actions of the ſyſtem. In our Enquiry, we ſhall begin with thoſe Actions which are moſt ſimple, afterwards conſider thoſe that are more complex, and then examine the particulars in which they all agree, and ſee if they will not all become ſubſervient to our notions concerning them. But firſt, it is neceſſary, we ſhould explain more particularly, what we mean by *Mind*. We have already ſeen, that the general laws of Matter are immediately

diately influenced by a ſpiritual immaterial Cauſe, and that without this power or energy, no Action can poſſibly be induced upon it. We have ſeen likewiſe, that a particular ſpiritual Agent, in ſome meaſure reſembling that which acts upon Matter, actuates the vegetable Tribe, a ſpecies of beings much inferior to that of Animals. The higher power of Animals likewiſe, we know, muſt acknowledge ſuch a Being: We muſt either then allow of another Agent, for the lower Actions we obſerve in Animals, and thus admit of two agents to one machine, or we muſt take it for granted, that the human Mind, in its full extent, is not incapable of theſe inferior Motions. The Mind then, we preſume to be no more, than that ſpiritual Agent which influences all the Actions which the human Body produces; that it begins with the loweſt, and ends with the higheſt, which we ſee performed by it. It is not fit, however, that this ſhould reſt upon a mere aſ-

ſertion. It requires a farther proof. This we ſhall endeavour to deliver as faithfully and as candidly as we can, in the following Treatiſe.

SECT. III.

Of the Organization of the Animal Body. Its moſt ſimple Actions or IRRITATIONS.

THE animal Body is a very curious and a very complex machine, calculated in every Motion for receiving impreſſions from external Bodies, and for reacting again upon them, in conſequence of their Action. By this, not only thoſe things that are injurious to the conſtitution, are repelled from it, but many œconomical functions are performed. But the whole is effected by one particular ſyſtem, that exiſts in our Bodies, and extends through the whole of them. This is the nervous power, which

which can almoſt be demonſtrated, or at leaſt ſuppoſed, where-ever any Action of the human Body is performed. This is the organization or peculiar ſtructure, to which we muſt appeal upon every occaſion. But what this organization is, whether it be a fluid that by certain fluctuations in its own ſubſtance produces theſe effects, or whether it be the vibration of cords, like muſical ſtrings, we ſhall not at preſent enquire. We ſhall only preſume to think, that whatever it be, it is ſurprizingly active, and may be compared to that ethereal ſubſtance, which we have imagined to be prevalent in the general Laws of Matter. This may be ſupported not only from analogy of their mode of Action, but from the Heat of animal Bodies, which cannot poſſibly be raiſed by any mechanical powers, but depends upon ſome obſcure and unaccountable cauſe. We have ſeen that Heat in Bodies in general, is determined by a ſubſtance of this nature, why then ſhould we not ſeek for the origin of it in our Bodies

dies from the ſame principle. And if this reign (as it doth) in the animal Body, why ſhould it not be directed by the only active power, that we have, the nervous influence. We ſhall not endeavour to determine, whether this power be extended to the whole ſyſtem, or confined to one particular part, viz. the Brain as the head of the ſyſtem from which it flows. It will be ſufficient for us to ſhew, that the Body organized in this manner is capable of receiving impreſſions; for it may not be an abſolute, but rather a collateral proof, that where this organization reigns, thence the mind's power is to be deduced. This however has been ſuppoſed by many learned perſons, but we hope to bring a proof from other circumſtances, and further evince a truth of ſuch utility to mankind. In conſequence of this ſtructure, which we have already mentioned, the animal Body is capable of receiving impreſſions, and of having Motions excited in conſequence, from almoſt all parts of Matter; and there are hardly

hardly any that can be applied to it, but what affect it in ſome meaſure or other.

THE moſt ſimple Action which we ſhall conſider of the human Body will be, that where the leaſt Motion is perceived, upon the acceſs of ſome other ſubſtance. Such a Motion as this is not confined to a living acting Body, but may be obſerved ſometime after death has taken place. In the living Body however, it is very evident to circumſpection. A part of Matter, ſuch as any acrid ſubſtance for example, is applied to an animal fibre, and immediately the Action, not only of that fibre itſelf, but of many others in vicinity and conjunction to it, will take place. This very ſimple Motion may be, and has been called a *Contraction*; but this term relates only to the diſpoſition of the fibres, as they are perceived by us, viz. as they are ſhortened in their lengths. But it does not refer at all to the cauſe, which occaſioned it, or explain how it is effected. We ſhall endea-

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vour to aſcertain the principles upon which it proceeds, and give a term more ſuitable to the nature of its Actions.

THERE are in all material ſubſtances, beſides their mechanical properties, certain others which are called particular, by which they are excited to act upon others, by a degree of Attraction, or rather mutual Repulſion, that is eſtabliſhed between them. By theſe principles, Bodies become almoſt always active, they corrode and deſtroy more inert Matter when acting with violence, they excite conſiderable vibrations in the vegetable ſyſtem by which their œconomy is preſerved, and by them the moſt ſimple Action of Animals is induced. From theſe effects then upon the animal Body, when applied to it, they have obtained the name of *Stimuli*; which term is given to them from that power of exciting contractions. Theſe ſtimulating Bodies then may be ſaid to be the remote cauſes of theſe Actions; but they do not act as

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upon Matter, by a mere ſimple Attraction *. It is neceſſary a more proximate cauſe ſhould be preſent, to give that Action of the Fibre that we ſee follow in conſequence. This we are to ſeek for in the animal Conſtitution, which is ſo eſtabliſhed as that this effect ſhall be produced. We have already ſeen in the vegetable Syſtem, that all the affections of that Body are brought about by ſome internal principle. This muſt certainly be the caſe here, the Stimulus is a ſubſtance that diſagrees with the animal Body, the agent or mind becomes acquainted with its pernicious quality, and hence it is implanted with a power to throw it off. An univerſal principle from this we may ſee then eſtabliſhed, by which, our ſpiritual power is engaged to attend to every thing of this kind, and to raiſe theſe Contractions by way of expelling them from

* If this was effected by a mere ſimple Attraction, the animal Fibre muſt be diſſolved, and the ſtimulating Matter become part of the conſtitution; which common obſervation aſſures us is never the caſe.

from thoſe Fibres, which they tend to deſtroy. A very juſt and good motive, we may alſo obſerve in theſe Actions, viz. of repelling every thing that is injurious. All Stimuli tend to deſtroy, and although they are neceſſary, to the protection and nouriſhment of every ſpecies of Animals, yet they contribute to this only as vehicles; for as they are the moſt ſimple means of exciting Actions, the animal œconomy could not be ſupported without their aſſiſtance. This will be ſhewn hereafter; let us, at preſent, endeavour to diſtinguiſh theſe Actions, by a term that is applicable to the means, by which they are brought about. I think the moſt proper name to be given to theſe Contractions or Motions in the animal Fibre, is *Irritation*. And the reaſon of this, is, becauſe it implies a concurrence of the Mind with the action of the Stimulus, and includes both their Motions. The Fibre likewiſe that is affected in the manner we have mentioned, may be ſaid to be irritated; and this diſpoſition

poſition it has to Contraction, is the proper idea of Irritability.

FROM what we have already ſeen, then we may obſerve that where we ſee ſuch ſimple Actions, produced in our ſyſtem, as we have taken notice of; we may determine that ſome degree of Stimulus is neceſſary to excite that affection, and that this Body can act only in the manner which we have deſcribed. The very ingenious and learned Dr. Haller has endeavoured to prove, that the Irritation of the Fibres of Animals, is not an effect produced by an immaterial ſubſtance, but that it depends on an elaſtic Gluten, interpoſed between the moſt minute parts of the Body, which induces this ſimple Action by a mere mechanical power. But if this Action be dependent upon the force of Stimuli, in the manner we have deſcribed; I ſhould inquire how it is that Stimuli are affected to this peculiar ſubſtance, and how they are prevented from actually deſtroying of an

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Animal, rather than promoting any Action in its conſtitution. An acrid Subſtance applied to any part of an Animal, when deprived of its vital powers, has this effect; but when it acts upon it in full vigour and activity, the former Action I mentioned may be obſerved. There is ſomething then which a living Animal enjoys, ſuperior to a dead one, in this reſpect, and muſt therefore be very different from a mechanical impulſe. If this Gluten be ſaid to poſſeſs the power of Vitality, it is no more than what we have been contending for; and only differs in attributing to it the means of Action, by which it is performed, but does not relate in the leaſt to the cauſe from whence it proceeds.

BUT let us further obſerve, that the only means by which we can judge of Vitality, in any Beings but ourſelves, is by an Action that we perceive induced in conſequence of a prior Stimulus acting upon them; becauſe it is counteracting the general laws

laws of Nature, and in this reſpect muſt be conſidered as the Action of a ſpiritual Agent, as much as that of the Will is, which no one diſputes. A Stimulus acts upon the animal Fibre, the Fibre endeavours to expel it by an Action of its own, or a contraction of neigbbouring parts; but this is no mechanical Action, for it counteracts the general laws by which that is influenced, and hence we are obliged to acknowledge it is one of thoſe which is directed by a Mind or Spirit, that is peculiar to our conſtitution.

WE do not indeed alledge, that the Mind in this caſe is a rational intelligent cauſe, or that this Action is governed by that part of our Mind, which acknowledges the higheſt of our faculties. And this for a very good reaſon, becauſe ſuch Motions are not the object of theſe powers. We are far from inſiſting likewiſe, that the Mind in theſe caſes, acts as a voluntary agent. It cannot refuſe its aſſent, to ex-

pel what endeavours to deſtroy its action, and hence is neceſſitated to act in this manner. We muſt take care, however, in the proſecution of this ſubject, not to extend the power of the Mind to too great a latitude. And for this reaſon let it be noted, that in this conſideration, we confine it to the particular part upon which it acts, and although we have advanced that the power of the ſimple Fibre, acts in expelling what is injurious to itſelf; yet we are far from yielding to the opinions of Stahl and his followers, that the Mind directs to what is uſeful and ſalutary, and excludes what is prejudicial to the whole ſyſtem. We hope to demonſtrate in the enſuing part of this ſubject, that even what is beneficial to the whole conſtitution, is neceſſarily introduced in this manner; that evil is of importance to promote good, and that to the one the Mind is of itſelf inactive, ſluggiſh, and inattentive, but with regard to the other alone, it is diligent and active. Thus we ſhall ſee, that the final cauſe of theſe Actions,

tions, is, that Providence may as it were bring good out of evil, and that the apparent means of effecting many of his purpoſes, are directly oppoſite to the real ones.

THESE things may not only be true, in themſelves, as we perceive them in the human Body; but may be ſupported from Analogy. We have ſeen that in the general laws of Matter, the apparent and truly diſcovered principles of Attraction and Gravitation may be directed and depend upon Repulſion, a law directly oppoſite to their nature and tendency. Simplicity, let me mention it again, is the great aim that Providence has in view in the creation of the univerſe, and that certainly acknowledges but one principle. It is worth while to enquire then, if even in our Body one law is eſtabliſhed for its nouriſhment and preſervation, as well as the performance of all its functions. Let this be granted to be univerſal activity, and in the examining of ſuch a point, it will be no derogation to

ſay, that it is productive of ſtagnation, or a quite oppoſite principle, in the ſame manner as reſiſtance or reſt, is produced by Repulſion in the natural world. Activity, if it were carried on in an uninterrupted manner, muſt certainly be prejudicial; for this reaſon therefore it puts on a different type, which is more ſalutary and advantageous.

LET us, to enforce what we have ſaid, examine a little into the nature of ſome of the neceſſary functions of our conſtitution. And in the firſt place, take notice of the moſt general and moſt important, the circulation of the Blood. It is not a deſign of Providence, that a Fluid of that or any other kind ſhould paſs through the veſſels of our Body, for no other purpoſe than to keep it in action, or become a diagnoſtic in caſes of diſeaſe. Theſe are circumſtances too trifling for ſuch an extenſive plan; but there is nothing elſe in which we can ſee its utility or advantage, unleſs

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we take a view of it upon the principles already laid down, as a vehicle to adminiſter to the ſupport and nouriſhment of the conſtitution, its true and genuine property. As it paſſes along from the heart through the whole ſyſtem, it acts as a Stimulus upon every Fibre, that it meets with, which Fibre reacts again upon it, and throws it off. By this continual Action it would appear, as if in time the utter deſtruction of the parts would be occaſioned. But this muſt always be attended to, that it carries its healing balm along with it, and depoſits in its proper place, that part of its nature that is devoid of activity, and only fit for the nouriſhment and preſervation of the ſyſtem. The circulation of the vital Fluid is the moſt conſiderable of the natural functions of the human Body; but all the reſt may be ſaid, in ſome meaſure, to acknowledge the ſame kind of argument. The various ſecretions, are only preparatories of ſluggiſh Fluids, from the more active, or a ſeparating the more ſtimulant from the

inert. Reſpiration likewiſe muſt be acknowledged to be a very great inconvenience to us, if nature had not provided it for the nouriſhment of our conſtitution. If it were neceſſary, we might demonſtrate the ſame thing in every other function; but we have ſlightly paſſed over even thoſe that we have conſidered, though indeed of infinite importance to us, becauſe it is ſufficient for us to deduce from them the force of the argument, and exemplify our ſentiments by ſome lively inſtances with which every one is acquainted.

IT has been the misfortune of almoſt all the functions, to have met with advocates in the mechanical ſchool; and ſome have been confident enough to aſſert, that they are the Actions of a ſimple machine, inſtigated by no ſpiritual Agent, and influenced by no Stimulus. Truth, evidence, and reaſon are ſo much in favour of the contrary, that we ſhall not endeavour to vindicate them from ſuch a character. The

more ingenious have long ago confuted theſe principles, by ſhewing that the effect was not equal to the cauſe, and that the ſame rules could not poſſibly take place as with Matter in general. The whole of our intention has been only to ſhew, what ſeems more natural and agreeable to common-ſenſe, and that Actions might take place in the animal Body upon the principles we have laid down. And if this be not a poſitive proof of the truth of the fact, we hope it will appear in ſome meaſure plauſible enough, to juſtify it from being abſolutely erroneous and inconſiſtent.

WE are aware, indeed, of a very ſtriking objection which may be alledged againſt us, from the following plea: We have advanced, that the Actions we have deſcribed, are thoſe of a ſpiritual Agent, always acting in conſequence of an impreſſion made by a Stimulus upon the Body; and yet no man can appeal to his own conſciouſneſs or experience, which are the

only known proofs of ſuch an Agent, that this Action ever happens in his Body, and that he would always remain ignorant of it, if it had not been diſcovered to him by reaſon and argument. In order fully to clear ourſelves of this objection, we muſt examine more particularly into the peculiar nature and circumſtances of the human conſtitution, which incline us to be conſcious or ſenſible of the Actions going forward in our ſyſtem. But this muſt be the buſineſs of a peculiar ſection.

SECT. IV.

Of Senſation or Conſciouſneſs.

BY Conſciouſneſs, is not here intended that power which the human Mind ſeems peculiarly to enjoy, of reflecting upon its own nature and exiſtence. That is a quality of this ſubſtance in particular,

and is dependent upon its rational and intellectual abilities. But by conſciouſneſs in this place, we mean *Senſation*; or a power of feeling within ourſelves a peculiar affection, which begets in our Minds an idea of ſome alteration or change, that is made in our Bodies. This is an affection, that we can by no means imagine peculiar to the ſpecies of mankind, but is common perhaps to all Animals, and is not entirely excluded from the vegetable tribe. Notwithſtanding this, however, all the actions of Animals are not affected by it, neither is it the only teſt of a ſpiritual cauſe, acting upon lifeleſs and inert matter. We have already ſaid that ſimple irritations acknowlege ſuch a cauſe, and yet we have no conſciouſneſs of their action. To ſettle this point then, let us endeavour to aſcertain the differences between Irritations and Conſciouſneſs or Senſations by the following particulars.

1. We

1. WE muſt conſider the latter as a high exerciſe of the former, i. e. That the ſubſtance that excites only an irritation, would, if increaſed in its powers of ſtimulating, become capable of creating a Senſation; and in this caſe, theſe effects ſeem to differ only in degree. To ſupport this by a few inſtances. The Tears which are ſecreted, and ejected alſo, in thoſe of tender and delicate conſtitution, belong to a very feeling and ſenſible part of the human body; but yet are, in general, harmleſs and inoffenſive, and give us not the leaſt degree of ſenſation. In conſequence of this, they muſt be conſidered as a ſecreted matter endued with a ſmall degree of Stimulus, and exciting an Irritation only. But if from any external cauſe, this humor ſhould ſtagnate in this tender organ, and become more acrid and ſtimulant, it will not fail to convince us of a violent ſenſation, and create great uneaſineſs. The ſame may be ſaid of many

many other affections of the animal machine; but it is peculiarly to be obſerved in almoſt every ſecretion. From hence it is, likewiſe, that many of the painful diſorders of the human body are produced. They all depend upon an high degree of acrimony in the juices, which are naturally innocent, ſalutary, beneficial to the conſtitution, and endued only with ſtimulus enough to create a gentle Irritation, and to perform their particular functions. But by diſorder, and much acrid matter introduced into them, or by any other means corrupted in their nature, they become prejudicial and dangerous, and occaſion great and excruciating pain. The Saliva and Gaſtric Liquors are innocent as well as uſeful, but from theſe cauſes they become pernicious, bring on diſorder and excruciate the tender nerves of the Stomach with exquiſite Torture. This will be ſufficient to ſhew us a natural diſtinction that ariſes between theſe affections: We proceed now to another difference

rence that may be obſerved between them.

2. THIS is to be determined by the difference of the motion that is induced, what creates but a ſlow and deliberate action, ſhall excite only an Irritation, whilſt we become highly ſenſible of what is more quick and violent. A Stimulus applied to any part of the body, may induce only one ſimple contraction of the animal fibre, by which it may be expelled; and in this caſe, the moſt ſimple Irritation only is produced; but if it return to the attack, and redouble its ſtrokes, we ſhall ſoon be conſcious of its influence, and the quicker and oftner this is done in a given time, the ſtronger our Senſations will be. We may adduce our inſtances upon this occaſion from the effects of light upon the Eye, or of ſounds upon the Ear. Either of theſe may be perceiyed by us with pleaſure, or may be indifferent to us, when the rays of light

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or the vibrations of ſound are excited but ſeldom, or are ſlow and deliberate in their action; but if an exceſs ſhould happen in either of theſe reſpects, a ſtrong ſenſation of uneaſineſs is perceived. We need not ſeek for more examples of this kind in the organs of ſenſe only, which may be conſtrued foreign to the purpoſe. The vital and involuntary powers alſo, will afford us ſufficient evidences of the truth of the obſervation. The action of the heart, is performed in perfect health in a regular and equable manner; and always when it meets with a Stimulus which is too violent, it exerts a very high degree of force to expel it, but that returns again aſſiſted by the force of the circulation, and requires the ſame degree of power to be renewed in that organ. From hence it happens, that the only Idea we can entertain of its exerciſe being quickened, is from the frequency of the approach of the Stimulus, as well as the exceſſive degree of it. It is neceſſary indeed in ſome meaſure, in this inſtance,

ſtance, that both ſhould concur in their action. The latter muſt have a great influence it is certain in the firſt ſtroke that is excited, but is only afterwards the inſtrument of renewing thoſe that ſucceed in a ſhorter time. From hence it happens, that the frequency of the approach of the Stimulus is the proximate cauſe of the quickened pulſe, which we may obſerve in the moſt common diſorder of the human body. A quickened reſpiration in the ſame manner may be occaſioned by the ſame cauſe; and this may happen two different ways; either from the air drawn into the veſicles of the Lungs by too quick an inſpiration, or from the accelerated motion of the heart. The velocity of the blood from the circulation in the latter inſtance, having irritated that organ, as we mentioned above, to a quicker contraction, occaſions it to drive the fluid through the lungs with a correſpondent motion; and theſe parts being endued with a power of ſenſibility from this impreſ-

ſion, neceſſarily bring about the quickneſs of this function.

3. BUT it is not only the degree of Stimulus with which a body is endued, or the frequency of its acting upon the animal fibre; which occaſions what is commonly irritable to become ſenſible of the impreſſions made upon it. The duration likewiſe by which it continues to affect us, is a powerful incentive to produce this effect. It may be very far from the nature of a Stimulus, when acting upon the animal fibre, immediately to occaſion a Senſation. Of this we may find innumerable inſtances. But if it is ſuffered to continue there for any conſiderable time, we are obliged to acknowledge its efficacy in this reſpect. A ſpark of fire from an igneous body, may accidentally fall upon any part of the human frame, occaſion no emotion, and be thrown off without any ſenſible exerciſe of a conſcious power. But it very frequently happens, that the body

body is not endued with ſufficient activity to expel it, it continues there for ſome time, we become ſenſible of the impreſſion, and are obliged to exert our voluntary faculties to aſſiſt in the expulſion of it. It is very probable, and therefore neceſſary to be mentioned here, that many diſorders of the human conſtitution may proceed from this ſource. The Body may be ſo influenced by previous diſeaſe, or the effect of former Stimuli, that the power of expelling offenſive matter, ſhall not be capable of exerting itſelf ſo perfectly as before; and in this caſe not only external violence, but even the matter that is neceſſary to many of its functions, may become deſtructive of it, as well as create a ſenſibility of its influence. And this will be done by continuing to act upon a part which is not capable of expelling every thing that is injurious to it.

4. A VERY great difference between Irritations, and thoſe actions of which we

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are made ſenſible, may ariſe from the different parts to which ſtimulating ſubſtances are applied. There is nothing more evident in the human conſtitution than this. One part of the body ſhall be fitted to be inſenſible of ſubſtances which another ſhall reject, and one part ſhall be only irritated whilſt the other is affected with a high degree of Senſation by the ſame ſubſtances. The internal cauſe in our ſyſtem by which this is occaſioned, and the mode of formation upon which it is conſtituted, have been much diſputed. We ſhall wave any conſideration of this kind, at preſent, and conſider it as a ſettled and determined fact, conformable to the reaſoning of genuine Philoſophy, and evident to the experiment of every ſearcher after truth, who has attended to this ſubject. A very conſiderable acid, ſuch as that of vinegar for inſtance, when applied to the external cuticle, will hardly produce a ſimple irritation, and at moſt occaſions only the corrugating of this part;

but when applied to the Tongue, it creates a high degree of ſenſe; and in the ſtomach produces excruciating, and often intolerable pains. Again, a very ſmall part of matter, that has the leaſt roughneſs in its ſurface, if accidentally it ſhould fall into the Eye, one of the moſt tender parts of the body, would occaſion much pain, and induce perhaps a ſtrong degree of Inflammation. But if this matter ſhould be conveyed into the Stomach or Inteſtines, it would ſcarcely ever be attended with pain, and only bring on a gentle irritation in theſe entrails to expel it.

THERE is a very remarkable difference of affection which ſubſiſts in various parts of the human body, and this is in ſome meaſure to be determined by peculiar ſubſtances that offer themſelves. Every ſenſible part ſeems to be more particularly affected to ſome kinds of matter than it is to others, whilſt theſe again ſhall become perceived only by a different organ, which

which may give them the preference. A very tender part, of the human body, ſhall be inſtigated to Contraction only, by many ſubſtances, and perceive no Senſation, but from ſome peculiar Stimuli, and theſe of a very acrid nature; whilſt, on the contrary, parts that would ſeem at firſt view not to be in the leaſt ſenſible, ſhall be liable to impreſſions of this ſort from very inert ſubſtances. Let us take our inſtances in this caſe, from the alimentary canal, or the ſphincter of the bladder on one ſide, and the ſoles of the feet on the other. The former of theſe, one ſhould think, calculated to be made ſenſible of the ſmalleſt Stimulus, whereas, very often, they are inſenſible to ſubſtances, one ſhould imagine, very acrid and pungent: But the latter, compoſed of a hardened, beaten and callous ſubſtance, are liable to impreſſions as often from the ſlighteſt circumſtances. The motion of a feather creates a ſtrong Titillation in them; which often terminates in Convulſions, and is

ſometimes the Author of a fatal Tragedy. Beſides this, it may likewiſe be obſerved, that many parts of the body, though affected with Senſation from ſubſtances of an inactive nature, are yet not ſo ſuſceptible of it from ſome that are more acrid and pungent. This is the moſt conſpicuous in the Eye, which although often tormented with very inert bodies, as we before obſerved, yet will bear the Knife without any very great pain or Torture. Of this Experience informs us in the operation for the Cataract, when every circumſtance almoſt concurs to render it exceedingly tormenting; and if we truſted to common reaſoning, we might imagine it would affect us very differently from what the fact evinces.

5. Not only the parts upon which ſubſtances act in the animal conſtitution, but the ſubſtances themſelves, likewiſe, which act upon it, offer a very great difference between the irritable and ſenſible powers;

powers; and this is not only determined by the various degree of action, with which they affect it, but alſo by their peculiar nature and properties. It is but in very few parts of matter, that we find an abſolute inactivity or inert quality when properly applied to an animal. They may all be ſaid to be endued at leaſt with a power of exciting ſome ſmall degree of Irritation. The parts of matter which immediately contribute to our nouriſhment, deſtined originally by nature for the purpoſe they anſwer, no doubt have the leaſt activity in them when applied to our bodies of any others that we know in nature. But what theſe parts are, and the means by which they are ſeparated from what we take in in the form of food, is not ſo eaſy to aſcertain. The whole of this œconomy is performed by a very gentle Irritation, of which we have no idea but from the effects it produces, and the ſeparation of a very acrid and ſenſible matter from the nutritious

ſubſtance, after it has performed its office. Every other kind of material ſubſtance, beſides that which immediately ſuſtains and ſupports the fabric, muſt, from neceſſity, be endued with the activity we have deſcribed, and diſpoſed to create ſome degree of Irritation. But we are not ſenſible of them all, we muſt therefore, to aſcertain this point more clearly, conſider matter as endued with general properties which are univerſally acknowledged, and others which are peculiar to different kinds.

The general properties of matter, which are neceſſary to be conſidered in this place, are thoſe of Denſity or weight, or diſtinct Figure and Formation. The firſt of theſe, acts upon the body as matter does in general, by its ſpecific gravity, and the body is ſo conſtituted, as to be affected by it, and to anſwer it by a reciprocal

procal action *. Notwithſtanding that this impreſſion is very ſimple, yet it moſt commonly happens that we are made ſenſible of it when it acts externally; but when it acts upon the internal parts, we are not always apprized of its force. And whenever this happens, it muſt be exceedingly violent, and act in deſtroying the conſtitution. Figure of bodies is alſo capable of affecting either our irritable or ſenſible powers, as it acts upon particular parts. That figure which gives roughneſs to bodies, affects commonly the

* This may be a proof of that general repelling principle, which we obſerved to inſtigate bodies to action. If in this preſent caſe, the action of a body by its weight upon our ſyſtem, was owing to an attraction of gravitation, this attraction muſt either be in our Bodies or in the Earth. That it is not in us, is evident, becauſe it never takes place, but upon contact. And that it is not in the Earth is clear, becauſe our Bodies interpoſe between us and the ground, if it attracted that body, which muſt attract our bodies too, and we ſhould become ſenſible of that action as well as the other.

latter, whilſt the former are excited to action, even by bodies that are ſmooth and round, and have an evenneſs and poliſh in their diſtinct parts.

BUT the animal conſtitution is moſt affected, by what are called the particular qualities of Bodies. Theſe have been generally ranked under the name of elements, a vague and undetermined principle from which no utility has been drawn, and which can lead to no juſt reaſonings or concluſions upon the ſubject. By theſe particular qualities however muſt be underſtood, the moſt minute principles to which we can reduce bodies by any proceſs we poſſibly can make uſe of *. With reſpect to the animal body, there is the greateſt difference formed upon this foundation, and from theſe qualities, the affections of which

* That very ingenious Gentleman, Dr. Cullen, late profeſſor of Chemiſtry in the univerſity of Edinburgh, and to whoſe inſtruction I am obliged to acknowledge the foundation of every thing ingenious, that is advanced in this Treatiſe, has divided Bodies into ſix Claſſes, Saline, Inflammable, Metallic, Earthy, Watry and Aerial.

which we are now ſpeaking, are principally induced. A very great diſtinction likewiſe, perhaps the only eſſential one that is neceſſary to be taken notice of, between the irritable and ſenſible powers, depends upon theſe principles. Some of them ſhall never be able to excite more than a ſimple irritation or be totally inert, whilſt others ſhall excite the moſt acute and violent ſenſation that we can ever experience. To exemplify the former, we may take the pure element *Water*. There is no doubt but that this raiſes an irritation, not only in the part which it immediately affects, but likewiſe through the whole conſtitution; yet it never affects us with any ſenſation, and we perceive only the conſequences of its Action. As an inſtance of the latter, let us take a ſaline body as an acid, which in external appearance ſhall ſeem not to be different from the pure Element we mentioned before: But upon application to our bodies, it will convince us, not only of the power of moving our fibres, but of a very

ſharp

ſharp and ſenſible influence. We might make a diviſion of bodies, as they differ from each other in this reſpect. We ſhall at preſent, however, content ourſelves with ſhewing how they affect us, in the moſt natural diſtinction that has been made of them. Saline bodies in general create ſenſation upon ſome part or other. Inflammable bodies are always ſenſible in a ſtate of inflammation, irritable only in their natural appearance. Metallic bodies act according to Gravity, except when heated, and then we are highly ſenſible of them; but this proceeds from the influence of the element of Fire. Earthy bodies in general are inert, and probably conſtitute the baſis of the nutritive Matter both of Animals and Vegetables. At beſt, they are capable only of an irritating power. Metals, as well as theſe, when mixed with a ſalt, are highly irritating, and ſometimes they become ſenſible by this means. Water is a very ſimple and pure element, and as ſuch, perhaps, might be inert with regard to our

ſyſtem.

ſyſtem. But in our common review of it, it is always mixed with ſome extraneous bodies of the ſaline kind, by which it generally irritates the conſtitution, and ſometimes we are ſenſible of its action. Beſides theſe, we might mention another principle, which has been diſcovered in bodies, viz. a fixed Air. But we can preſume but little concerning its powers in the reſpect we are ſpeaking of; we ſhall therefore leave it to the conſideration of our reader, by recommending to his peruſal a very ingenious treatiſe upon this ſubject by Dr. MACBRIDE of *Dublin*.

IT has been much diſputed by thoſe, who are fond of conſidering every phænomena of nature as the effect of mechaniſm, whether theſe peculiar qualities in bodies do not ariſe from an impulſe of this kind, or are founded on the form and texture of the minute particles of which they are compoſed. They have carried this ſurmiſe ſo far, as to aſſign to the different kinds of

Matter

Matter the peculiar figure by which they are enabled to act. But how fallacious and groundleſs this doctrine is, will appear from the following conſideration. All bodies, which are diſpoſed to action from a mechanical impulſe muſt be angular, and for this reaſon, becauſe there are different and various bodies in nature, and this variety can be grounded only upon ſuch a form, for ſpherical bodies admit of little difference in this reſpect, and when joined together, can admit of no variety in Action from what they have when ſeparated, which is contrary to what we conſtantly perceive; and thus if we were to grant activity to them, all activity muſt depend upon the ſame ſhape, which is the ſame with no ſhape at all. Having found then, that bodies, in order to become powerfully active, muſt have an angular figure, let us endeavour to account for the varieties of combination from theſe principles. A great variety of angular ſhapes have been given to the ſaline parts of Matter: Let us then

take

take the moſt ſimple of theſe, viz. an Acid, and appropriate to its moſt minute particles that figure, which, from a mechanical impulſe is the moſt powerful, that of a triangle or wedge. Let us preſume alſo, that an alkaline body partakes of that figure which conſtitutes a ſquare. By comparing theſe two circumſtances together, we ſhall find that the triangle form of an acid never could ſubſiſt, and that we ſhould never ſee it in a pure and unmixed ſtate, but it would always put on the form of an alkali; and for this reaſon, becauſe two triangles conſtitute a ſquare, and a number of triangles contribute more perfectly to make this form. In a large quantity of this Matter therefore, the greateſt part would be alkaline, and there would only be a few ſtragling triangles, that would put on the form of an acid. What a difference does ſuch philoſophy as this make in the real ſtate of things, as they are preſented to us, and as we determine their qualities. The ſame reaſoning will hold good, with reſpect

reſpect to every other figure, that we may imagine bodies capable of ſuſtaining. They can never be preſerved pure upon combination; and at laſt they will all be reſolved into one. A ſquare or cube is the moſt perfect body of any angular one, becauſe all others will contribute at laſt to form it, and without a high degree of mixture. For this reaſon therefore, we ſhould ſee all bodies in any quantity ſo perplexed with it, that it would never be diſincumbered, but would offer itſelf upon every occaſion. This is abſolutely contrary to the fact. Bodies are ſo far from loſing their reſpective qualities by their quantity, that theſe are very much increaſed by it, and it is only by adding others to them of very different properties that they are loſt or obſcured.

6. ANOTHER diſtinction between the Actions of the ſenſible and irritable parts of the animal conſtitution, may be derived from the different ſtates in which we often find the

the Body. This may be owing to diſorders, which have long prevailed in altering its original nature, to ſome natural imbecillity which conſtantly attends it, or to a difference of diſpoſition to be affected by Stimuli which offer themſelves to its Action. And this depends again on the certain peculiarity of conſtitution, which perſons enjoy different from each other, and by which one becomes highly ſenſible of, whilſt the other is only irritated by particular parts of matter. Nothing is more evident than the whole of this diſtinction. There are certain ſeaſons of every mans own life and obſervation, in which he may obſerve a difference of feeling in his own body. The Stomach, we are all ſenſible, is an organ which has moſt commonly a capacity of receiving and digeſting almoſt any kind of food, by a ſimple irritation of which we are entirely inſenſible: But it often happens upon the ſlighteſt diſorder, that it is deprived of this power, and that its peculiar ſenſation of ſickneſs and nauſea is intro-

introduced. The ſame may be obſerved of many other parts of the human body, not to mention the affection of the Eyes by Light, of the Ears by Sounds, and of almoſt every other Senſe, when operated upon by their proper objects in a ſtate of diſeaſe.

As we have now ſettled the foregoing circumſtances relating to the difference between the irritable and ſenſible powers, let us endeavour if poſſible to account for the facts.

FROM what has been advanced, we have ſeen, that Irritation, conſidered ſimply, depends upon an Impulſe made upon the living fibre of an Animal, and the re-action of that and other fibres to expel the cauſe of it. We have ſeen likewiſe, that Senſation is a part of the irritating power, and is occaſioned by an exceſs of impreſſions. Thus all the cauſes, which influence the latter, will, if greatly heightened.

tened, likewiſe give riſe to the former. From hence it is, that we muſt conſider Senſation, not as any peculiar kind of Action, but as a particular circumſtance or affection that attends on Irritation, viz. our Idea or Notion, of what otherwiſe we ſhould not be ſenſible or conſcious: But what is it gives riſe to this circumſtance? It may be anſwered, that as the cauſe is heightened, and the re-action heightened, we muſt become ſenſible of them. But there is no reaſoning in this explication. To make a difference of affection, there muſt be ſome diſtinction, either in the cauſe or the effect. We ſhall preſume then that there is a difference in the effects that are produced, and this we think to prove from the following propoſition.

THE cauſe which acts upon the fibre is too powerful for the re-action which ought to correſpond to it; and hence the ſum of the impreſſions is greater than the ſum of the actions; whereas in ſimple Irritation, the

ſum of both theſe are equal. A Stimulus acts upon the body, the body expels it, and there is no Senſation: But if we can imagine this Stimulus to act with the force of *two*, and the re-action to be only as *one*, then the former will have double the force of the latter, and moſt probably will occaſion a degree of ſenſe. And the cauſe of this will be, a reſiſtance which the body finds to its action, and which it is not able to overcome or ſurmount. All reſiſtance that we perceive muſt be determined by duration, and to this only conſciouſneſs of action can belong. Where the impreſſion and the action conſequent upon it, are inſtantaneous, we cannot poſſibly have any ſenſation; becauſe we cannot enjoy two ideas at the ſame time, but one muſt of neceſſity be abſorbed in the other. For in this caſe, how could we determine to which particular conſciouſneſs ought to belong, to the Impreſſion, or the Action that is occaſioned by it. To bring an example to prove this, we may refer only to a number of

of colours fixed upon a wheel; where in a conſtant revolution, the diſtinguiſhing marks of every particular, are entirely loſt, and the whole ſeems to have the appearance of a white, which is no colour at all. This notion of reſiſtance, as the ſource of Senſation, is not entirely imaginary, for it may derive ſome aſſiſtance from analogy with other affections of our minds. To enforce it, let us appeal to thoſe Senſations or Perceptions we receive from what are called the Organs of Senſe. We more eaſily form an idea or notion of any objects, that are of a rugged, uneven and rough ſurface, in which we more difficultly overcome the reſiſtance that is made to our view, than of thoſe of a ſmooth and poliſhed ſurface, which are eaſily perceived, paſſed over with indifference, and moſt readily forgot. This is not only evident in objects of Senſation, but muſt likewiſe be acknowledged in thoſe of Reflection likewiſe; the more ſmooth and even the countenance of any perſon is, the more eaſily it is forgot; and every thing

incomprehenſible, carries with it the idea of ſomething round and even. Hence it is, that we repreſent Eternity, and all our Ideas of Spirit, whenever we revolve them in our minds by a figure of this kind. Whether upon the whole, this doctrine is fallacious or not, we leave the world to determine; to us it appears more than probable, but we hope further to elucidate it when we ſhall hereafter conſider the different modes of ſenſation more particularly. At preſent let us attend a little to the final cauſe of the diſtinction, between the affections of Senſe and thoſe of ſimple Irritations.

IT was to anſwer a noble, wiſe and important deſign of Providence, that we were thus created, not to be ſenſible of thoſe actions in our conſtitution, which are the moſt neceſſary to the ſupport and preſervation of life. For it not only relieves us from the trouble and anxiety of conſtantly attending to them, but deprives us of an

opportunity of wilfully injuring our moſt uſeful functions, or deſtroying our very exiſtence, without the knowledge of the reſt of our fellow creatures. If we were to have tranſacted the whole concerns of our being, by a conſciouſneſs or ſenſibility of the action of the vital powers; it would be impoſſible that we ſhould ever have attained that juſt and regular management of them, that propriety requires; and we ſhould now then have forgot the utility of their exerciſe, and have ſacrificed our lives to the inadvertency. But this may be a conſideration ſuperior to every other, that perhaps all Animals have ſomething elſe to do than attend merely to the preſervation of their being. Man in particular has ſo many avocations and employments, ariſing ſucceſſively one after the other, that it would be impoſſible he ſhould attend to any of them with diligence, but at the ſame time he muſt neglect the neceſſary functions of his body. The preſervation of our being is not the ſubject of

mental attention or conſciouſneſs, notwithſtanding it depends upon the Mind, and is entirely to be ſupported by that principle that directs us in all our concerns of life.

MANY philoſophers, and ſome of them indeed of the greateſt note, have conſidered Conſciouſneſs as an eſſential property of the Mind, without which Affection could not poſſibly exiſt. But that this fact is diſputable, is evident from the following conſideration; that there are many voluntary actions which we often perform without it, and very often loſe it in thoſe circumſtances, where before we attended to its influence. This is moſt evident in the want of attention to the ſtriking of clocks, or other ſounds of this nature, when we are much uſed to them or diverted by different objects. There are the ſame powers preſent to occaſion the ſenſibility of the Mind in theſe caſes as well as any other; but the attention of our conſcious

powers,

powers being withdrawn, the lower influence that continually guides and directs the ſyſtem, throws off the impreſſion without any notice being taken of it. From this and other circumſtances of the ſame nature, many have been led to imagine that the Mind formerly was conſcious of the exerciſe of the vital powers, and that in proceſs of time, by frequent neglect, it became entirely deprived of this attention. We ſhall not endeavour to confute this notion, becauſe there is no neceſſity for the ſuppoſition to ſupport what we have alledged. If Conſciouſneſs is an eſſential quality of the Mind, it muſt always adhere to it, and never leave it to itſelf; and if the Mind can exiſt without Conſciouſneſs, there is no neceſſity to ſeek for it as a part of its nature.

WE flatter ourſelves that our ſentiments upon this ſubject, are not only more probable, but more plauſible in themſelves, and more equal to the conſideration of a

vulgar capacity, reflecting on its own powers, than what has hitherto been alledged. Upon the whole then, let us conclude with this ſlight recapitulation of what we have advanced: That the ſimple Irritations, or primary actions of the animal body are the actions of a living fibre; That this fibre is directed by a mental faculty: That the reaſon why we are not conſcious of this action is, becauſe the impreſſion upon the body from a Stimulus, and the action which expels it, are inſtantaneous: But that when the impreſſion is ſuperior to the immediate action, we begin to be conſcious of it; and that upon the whole, this forms the diſtinction between thoſe actions which have been called Senſible, and thoſe which are irritated only to contraction.

BEFORE we diſmiſs this ſubject, it will be worth while to take notice of a diſtinction that has taken place in Phyſiology, and has been canvaſſed by the moſt ingenious

nious perſons of the preſent age. The learned and accurate Baron *Haller* firſt ſtarted the notion of ſome parts of an Animal being ſenſible, whilſt others only were irritable. The facts ſeemed to be founded upon obſervation, and though much diſputed, might be juſt. But the theory which he built upon it, was exceedingly fallacious. He imagined there was ſomething diſtinct from the human Soul, which occaſioned the latter power, and that it was directed by the efforts of a mechanical influence. But if he had attended to the facts, which we have already laid down, to enforce the diſtinction between theſe effects, he would have found no doubt the truth of our obſervation, that the Action is one and the ſame; but that as it varies in its different effects, our thinking faculties become intereſted in the review.

SECT.

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SECT. V.

Of the Origin of the Senſe of Pleaſure and Pain.

EVERY thing which offers itſelf to our Senſations, or becomes the object of our Conſciouſneſs, is always attended with one or other of theſe modes, Pleaſure or Pain; the former ariſing from thoſe things which are agreeable to us, and which we deſire to retain, the latter from thoſe that are diſagreeable, and which we deſire to avoid. What there is in the Mind that ſhould create either of theſe Affections, upon the acceſs of ſuch objects, is not eaſy to explain, and can be referred only to the will of the Deity, who originally intended it for our utility and advantage. It will be more to our purpoſe to enquire how it is, that the agreeable or diſagreeable Senſations can ariſe from the ſentiments we have already delivered

vered concerning the general Idea of Senſation, and the bodily Affection to which we have attributed it. We are originally conſtituted to become active, and not paſſive Powers, and by this Action we are inclined to expel every thing that offers itſelf to the animal Fibre by a living effort, as we have already ſaid. Reſiſtance from any external circumſtance is what reſtrains our active Principles, endeavours as it were to deſtroy their influence, or at leaſt to curb and check them in their Action. The Senſation then that we perceive, from ſuch an effect, muſt inevitably be diſagreeable and uneaſy to us; and from this we conceive the idea of Pain, or the conſciouſneſs of thoſe Senſations that are diſagreeable. To illuſtrate this more particularly, let us reflect a little on the nature of the different kinds of Pain to which we are accuſtomed.

THE different varieties of this Affection may be reſolved into two kinds; either that which tends abſolutely to deſtroy the human

human Fibre, by lancinating or dividing; or that which operates by a conſtant unvaried compreſſion. It is the former of theſe ſorts which moſt merits our attention, and is what we moſt frequently meet with. At firſt ſight, it does not ſeem to be eſtabliſhed upon the principles we have laid down. But if it be conſidered that our opinion of Reſiſtance is not a mere mechanical oppoſition to the Action of the Fibre, but is determined by the Action of a Stimulus, which overcomes the irritable and active powers, and that it does not deſtroy the Action of the Fibre, but only prevents the effects of it; this may be more eaſily deduced from it. We are not merely to attend to that kind of Pain, which is determined by the k[illegible], but all thoſe that are occaſioned by acrid and corroding ſubſtances are what particularly belong to this head. The ratio of the Pain, which proceeds from theſe, will very much corroborate our ſentiments. Thus a violent Stimulus acts upon the Body, it endeavours

to

to expel it, but the Reſiſtance is too great to be overcome, the Body continues to act, the Stimulus wont give way, and hence it is that the violent Senſations ariſe: But if by any artificial means the Stimulus is removed, the Body is reſtored to its uſual freedom, and the Pain entirely ceaſes. The Pain that ariſes from the knife, as in the amputation of a limb, &c. does not properly belong to this head, although the ultimate, but not the immediate effect of this operation, is of this kind. It belongs more properly to Compreſſion, which muſt be conſidered as a mechanical Influence. For it is not the immediate part that is cut thro' which moſt probably feels the pain, but the neighbouring and adjacent ones which are violently compreſſed at this time*. Compreſſion, although a mechanical influence, excites, when violent, very grievous pain, induces the Body to action, and by

* This may be demonſtrated from the extent of the Inflammation which ariſes in conſequence of ſuch operations.

by its force overcomes and reſiſts it. By this means it acts as a Stimulus, and creates the ſame effects. But this is no argument that Stimuli act by mechanical properties. For although Mechaniſm may have this influence, yet this is no proof of the converſe of the propoſition. Many very learned phyſiologiſts have favoured the opinion that all Pain proceeded from a danger of the ſolution of the Fibre, and the cauſe they have adduced from a principle of our thinking Faculties, the apprehenſion of what was deſtructive to the conſtitution†. But without they can determine, ſomething already preſent, by which this thinking Principle ſhall be brought to Action, their reaſoning will have but little efficacy in this affair. It is from nature, and our original con-

† Si fibra nervoſa, cerebro orta ita extenditur vel alio modo diſponitur, ut diſſolutionem minitetur, fit Doloris Idea. Boerhaavii Aphoriſm. §. 220.

Tot malorum auctor ſimul tamen vitæ cuſtos eſt, qui et de præſente noxa, ejuſque conſecutionibus, mature monet, et compellit ad medelam quoque modo querendam. Gaubii Pathol. §. 675.

conſtitution that we are to ſeek for every Affection that happens to the Body, and this will inform us, that it is ſomething which really exiſts as an acting Principle in the Body, and not what threatens a miſchief to it that cauſes Pain and Uneaſineſs; and that notwithſtanding the diſſolution of the immediate Fibre may in ſome caſes be threatened; yet this is only an effect, and can have no kind of reference to the origin of this Affection. Much leſs then can the apprehenſions of a general evil to the ſyſtem, be productive of it.

LET us now enquire how it is that Pleaſure ariſes in us, or that we perceive ſomething in many Actions very agreeable to Senſe. It is not in the object or thing itſelf that offers, that we muſt ſeek for this Affection, but muſt refer to the ſame Actions from which we found Pain to ariſe. This is not to be determined by the degree of Action in the Stimulus, for in that caſe every ſlight Pain would be a Pleaſure,

ſure, which is not always the caſe. We muſt rather attribute it, to the Action of the animal Conſtitution, and reaſon in the following manner. We have ſeen that Pain ariſes from the Reſiſtance which the Stimulus makes to the Action of the animal Fibre, which cannot poſſibly prevail to remove it; and in this caſe the remote cauſe of the Affection we muſt attribute to the reſiſting object. But if we ſuppoſe that after this Reſiſtance has been made for ſome time, the Body acquiring new vigour be enabled to remove it, then no doubt but the Action will be very grateful and conſtitute Pleaſure; and here the remote cauſe muſt be ſought for in that influence which the Body acquires. The difference then we ſee between theſe Affections depends entirely upon circumſtances relating to the moſt ſimple Actions of the animal Body, and is determined in a great meaſure by the power of the Mind over them. It is not only eaſy to conjecture that this may be the means by which pleaſant Feelings are

produced,

produced, but we may carry the theory a little further, by ſuppoſing that the Mind exerts not only a ſufficient degree of Re-action, to expel this noxious matter, but that it adds to the force of it, beſtows more of its power than is juſt neceſſary to promote the end, and glories in the conqueſt it has made.

AN objection may be made here that Pain is neceſſary to precede Pleaſure, and that we ſhould always have a Senſe of this Affection previous to the Influence of the other. This is very often the caſe, as muſt be acknowledged by every one, and where it is not ſo, it muſt depend upon the ſhort duration of Reſiſtance that is made. The Body is not ſo powerful as that it can expel any very great degree of Stimulus, it muſt be therefore from the ſlighteſt degree which Pleaſure ariſes, but yet there muſt be ſome Reſiſtance, or no Senſation would ariſe as ſhewn above. In this caſe then, the time of the Reſiſtance,

and that of the Re-action, muſt very little exceed that of a ſimple Irritation, but the latter prevailing, and that often in a ſuperfluous degree, makes us more ſenſible of it, whilſt the force of the Reſiſtance is entirely obſcured and obliterated. This will be more evident, if we reflect a little upon the nature of thoſe Senſations which give us Pleaſure. Titillation is generally reckoned to be one of theſe: this is brought about by a ſlight Impreſſion, but the Motion, by which we are continually agitated, is very evident and diſtinct. If the Reſiſtance continue any length of time, we perceive it and become uneaſy; but if the Motion of the Fibre immediately ſucceed, we perceive no Pain to ariſe from it, but the oppoſite Affection takes place. The ſame may be ſaid of all the Pleaſures we experience from Senſe. It is well known that Pleaſure is very inſtantaneous and accompanied with viſible Motions; and beſides, it is univerſally acknowledged that this Affection, if continued for any time, becomes intolerable Pain.

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To confirm our ſentiments upon this occaſion, we may enforce them, not only by an enumeration of the Pleaſures we derive from the different organs of Senſe, which we ſhall afterwards conſider more particularly; but from analogy with the origin of theſe Affections, when referred to our moral powers. Where our Wills find a reluctance and difficulty to act, there it is that Pain and Uneaſineſs ariſe; but where they are able to overcome all difficulties, to act freely and without controul, we experience the higheſt degree of Pleaſure. It is the ſame in objects of Taſte, thoſe things that are diſagreeable and harſh, have a certain deformity, roughneſs, and unevenneſs of ſurface, by which we cannot comprehend them; or are full of diſcordant ſounds which diſtract our Attention. But Beauty, Uniformity and Harmony, attract and pleaſe wherever we meet with them.

BEFORE we quit this ſubject, let us review the whole of theſe Actions, and the circumſtances belonging to them, compare them together, and perhaps, by this means, throw ſome further light upon the ſubject. The moſt ſimple Action of the human Body, is an Irritation. It proceeds from the Impreſſion of a Stimulus and the Re-action of the animal Fibre. Theſe Actions are ſynchronous, and upon this account the ſenſible part of our nature does not become acquainted with them. They are likewiſe equal with each other, and although ever ſo numerous, yet the ſum of the Actions is always in proportion to the ſum of the Impreſſions. This is the caſe with thoſe of which we are not conſcious, but whenever this Affection takes place, it is neceſſary that ſome further Impreſſion be made, inſomuch as to cauſe a Reſiſtance, and there the ſum of the Impreſſions is ſuperior to the ſum of the Actions; and we muſt not only become ſenſible of the

the Action, but it affects us with Pain and Uneaſineſs. But if this Reſiſtance laſt but for a ſhort time, before it is overcome and expelled by the Body, and a high degree of power is exerciſed for this purpoſe; the force of the Reſiſtance is obliterated, and in the given time the ſum of the Actions is ſuperior to the ſum of the Impreſſions. We become ſenſible alſo of this effect, but it is a Senſe of a different kind, and as in the other caſe the continuance of the Reſiſtance gave Pain, this power which we exert to overcome it, occaſions a pleaſant and agreeable Feeling.

SECT. VI.

Of Perception.

BESIDES what we have mentioned, there is another diſtinction, which offers itſelf upon this ſubject, and which requires our examination, before we explain the

Senſations that ariſe from particular organs, appropriated to convey them. In ſome of theſe we are not ſenſible of the Irritation which is made in them, and we perceive neither Pleaſure nor Pain to ariſe from their Actions. They however convey notions to our Minds, from their influence we derive a high degree of Information, and that act of the Mind, which the Metaphyſians denominate Perception, is performed. Let us adopt then this term to expreſs this difference in our Irritations, and make a new ſpecies of theſe Actions eaſily diſtinguiſhable from mere Senſations. But how this Perception is brought about by a corporeal Action, will be more difficult to explain, perhaps, than what we have already examined. It is certainly a kind of Irritation, excited by a Stimulus, and admits of a reciprocal Action of the animal Fibre to expel the cauſe of it. But we are conſcious, neither of the Impreſſion, nor of the Action, that reſults from it; and yet in one ſenſe it may be ſaid to be a kind of Senſation,

tion, as it informs our Mind of ſome notions of which we were before ignorant. Theſe notions, however, are very different from thoſe which we experience from our common Feelings, and upon this account muſt be conſidered as a different Affection of the Mind. May not this diſtinction in ſome meaſure be ſought for, in ſtructure and organization of Parts, properly fitted to convey particular Ideas to the Mind, and eſtabliſhed upon a correſpondence or agreement between the Organ and the ſtimulating Matter that acts upon it? This opinion is not by any means inoongruous with the general rules we have laid down. It only refers to a higher principle than we have already conſidered, the immediate Action of the Mind in the exerciſe of its own powers. And in this view, it is no more difficult to imagine, that upon a peculiar agreement of parts of Matter with the nerves of our conſtitution, ſuch an Affection as this ſhould ariſe, than that Senſation ſhould ariſe from a kind of diſagree-

ment of parts, that Reſiſtance ſhould occaſion Pain, and the overcoming of it ſhould be the cauſe of Pleaſure. Perception may be conſidered as one Affection, ariſing from Irritation, and Senſation another; but with this difference, that the latter is eſtabliſhed upon the mode or manner of the Action, whilſt the former is founded upon the Bodies which make the Impreſſion. In general, thoſe Bodies which act upon the irritable Fibres of the organs of Senſe, cauſe no Perception; but are received and expelled without any notice. But upon peculiar Bodies offering themſelves, they cauſe an idea or notion to ariſe in the Mind, and it is ſo eſtabliſhed, that by peculiar organs, and thoſe only, theſe Bodies ſhall be permitted to act, and where theſe are not provided, it is evident that they cannot poſſibly have any influence or effect, but muſt paſs off unnoticed and unattended to. From what we have advanced, we are enabled then to form this concluſion; that Perception is an Affection of the Mind,

different

different from common Senſation, notwithſtanding it be founded upon the ſame Action of the Body, and the Irritations cauſed by ſtimulating Matter are the original of both. At the ſame time, however, let us take notice, that many of the organs of Perception, or of Senſe, as they are generally called, are capable likewiſe of very acute Senſations. This we ſhall examine hereafter in a deſcription of theſe different organs, and diſtinguiſh between thoſe that are more properly organs of Perception, and thoſe of Senſation, and where they agree in having both theſe affections, point out the diſtinguiſhing marks of each.

If we examine this ſubject, however a little more particularly, we ſhall find that Perception certainly admits of a mode of Action, and in this it reſembles in many reſpects that Action which occurs in Senſations, and thus will bring a ſtronger proof of its foundation upon the irritable power. In our examination of ſimple Irritations,

tations, which could not produce Senſe, we obſerved that the Re-action was always inſtantaneous with the Impreſſion; and that where the Reſiſtance was ſufficient to deſtroy this effect, Senſation always aroſe. But we are not to conſider this ſpace of time, as a mathematical inſtant, which will admit of no intermediate diſtance. All time is eſtabliſhed upon compariſon, and an hour a-day, or the greateſt length of time, may appear to ſuperior beings, as a ſecond of time does to us. In the caſe before us, we may refer in our Minds to a ſpace much ſhorter than we can be ſenſible of. That time, in which a ſimple Irritation is performed, no doubt will admit of this diſtinction; for we are never ſenſible of it till a great number be excited. We may give an inſtance of this from the circulation, we perceive the beating of the heart very often to be ſynchronous with the pulſe, and yet a thouſand Irritations muſt be raiſed by the blood, in its paſſage from the

the heart to the artery, where the pulſe is felt.

SINCE then, ſimple Irritations are performed in ſuch quick time, that it is impoſſible we ſhould be ſenſible of them, and that there is a great deal of intermediate ſpace, in which we may not be conſcious of the Reſiſtance that is made; why may not Perception, be eſtabliſhed upon ſome action of the ſame kind, where the proper objects preſent themſelves to it; and thus it will appear to be only a more quick Senſation. We leave the determination of this conjecture to the judgment of more wiſe and able perſons; and all the confirmation we ſhall endeavour to give it will be from this propoſition. That Perception is always performed more quickly, ſuddenly, and inſtantaneouſly than Senſations are ever produced. This will appear perhaps to many, nò more than the effuſion of fancy and imagination, upon which no judgment can be formed, or any truth aſcertained. But to

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any one, who reflects in what a surprizing manner, the rays of Light, the vibrations of Sound, or the distinctions by tangible Qualities excite Perception, will not wonder that we have given to this affection a superior degree of excellence. With regard to Sensations, we are not always so absolutely acquainted with the causes which produce them, as to be enabled to determine the distance of time in which this effect is produced. But in those cases, where we can observe the operation of the cause, it does not appear to be immediate. It may be justly enquired how are we to determine this question? It would be ridiculous to search for the decision from the Sensations themselves. For they could ascertain no more than that we begin to feel, as soon as we feel in reality. A truth indeed which no one can dispute or subvert. The proper test will be some other power, which we set up to evince this fact. But what can we employ, but this percipient power, and if it be capable of this, it determines itself

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in its ſuperiority without any controverſy. Let us ſee, however, how far with juſtice this can be done. It is certain we can perceive an object by our external Senſes, not only to approach us to deſtroy, but likewiſe to act in the manner it often does, when it cauſes a Senſation, previous to that effect. There are few people who ever perform amputations upon themſelves, or mangle their bodies when in their right ſenſes, ſo as to perceive any peculiar effects with attention. But in thoſe operations, which are performed upon others, notwithſtanding the terrifying apparatus that is prepared, the powerful workings of fancy, and the terrible expectations of approaching torment, with which the mind is agitated; yet we may perceive inſtants between the ſhrinks of the patient, the moſt certain marks of Senſation, and the operation of the knife. This we hope will be ſufficient to found our conjecture upon, that Perceptions ariſe from more ſimple Irritations than what Conſciouſneſs of the

Action

Action does. We ſhall now proceed to a further enlargement of the ſubject; and firſt let us conſider ſome of the modes of this Affection.

SECT. VII.

Of the Pleaſure and Pain which reſult from Perception.

IT is not the chief end of Perception, to convey to us ideas of Pleaſure and Pain, any otherwiſe than by reflecting upon the objects of it, we become enamoured or diſpleaſed with ſome particular circumſtances which belong to them. But yet notwithſtanding this, there is a kind of intellectual or perceptive enjoyment, that we often derive from the immediate operation of the Senſes. It will be neceſſary then perhaps, that we ſhould explain the difference between

tween this, and the Pleaſures we derive from Senſation, which we have above deſcribed. It is a diſtinction indeed, which reaſon dictates, and which will be much inſiſted on in the future part of this Treatiſe, and therefore it is well worth our attention. Every man, who reflects in the leaſt, upon the ideas he receives from external objects, will grant there is a very great difference between the Pleaſure and Pain, he receives from his common feelings and the diſagreeable idea he receives of bodies, as they affect the peculiar organs of Perception. To illuſtrate this by an example, a very rugged Body, ſuch as a ſharp and uneven piece of Flint, when rubbed hard againſt us, gives a very ſenſible Pain. But if at any time we ſhould ſhut our eyes, and ſuch a body ſhould be preſented to us to handle, yet although it were in the moſt gentle manner, we ſhould find a diſagreeable idea from it, different from what we uſually feel, and what might very properly be called a perceptive or intellectual Pain.

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In the ſame manner as ſenſible Pains are produced by a Reſiſtance to a free exerciſe of the animal Fibre, ſo this may acknowledge the ſame cauſe, and allow of a degree of Irritation, to be determined by the principles we have already advanced. Perhaps we ought to go no further than the form or peculiar diſpoſition of the ſubject, to be affected by the reſpective organ, and allow only of a diſagreement in the parts to effect this purpoſe. No doubt but this will occaſion a difficult Perception in our Minds, and from hence give a painful idea from this circumſtance, but the ſlightneſs of the affection will in ſome meaſure tend to make it too inconſiderable to be taken notice of. But when we take in the ſame mode of Action, indeed as in Senſations, it may more readily be diſtinguiſhed, and ſomething like a ſenſible Pain be produced. In the ſame manner likewiſe the agreement of different kinds of Matter, with the animal organs, may produce a mutual Action between them, and from the eaſe by which this

this conſent is obtained, ſome negative kind of Pleaſure may be derived. But the greateſt Pleaſure of this kind muſt ariſe from overcoming a reſiſtance perceived in the Body, in the ſame manner as was mentioned with regard to Senſations. The percipient Pleaſure and Pain which we have here conſidered, if it be eſtabliſhed on the object, rather than the mode of Action, cannot properly be called ſenſible, or ever arrive at ſuch a degree as to admit of this Affection. But if it be founded upon this latter quality, and arrive to a very high degree, a Senſation may ariſe from it. And this, becauſe as it is an Affection of the Action of the ſimple Fibre, and is determined by time, if that be increaſed, it will appear in this character. This we ſhall have occaſion hereafter to conſider; and may be able perhaps to derive ſome conſiderable conſequences in Phyſiology from this ſource. But we proceed to examine the Motions incident to the different Organs of Senſe.

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CHAP. V.

Of the ORGANS of SENSE.

SECT. I.

Of Touch.

WE ſhall purſue this ſubject in the following order, begin with thoſe Organs that more immediately reſemble our Senſations, and gradually aſcend to thoſe that are more intellectual, and convey the moſt inſtruction to the Mind. The firſt which we ſhall examine, is that of Touch, or a general diſpoſition we have to perceive bodies when applied to almoſt any part of our ſyſtem. There is one part however, in which it is more conſiderable than the reſt, where we

feel

feel moſt diſtinctly and completely, and which may very properly be called its peculiar Inſtrument. This is the extremity of the fingers, where nerves are branched out in a great quantity, to adapt it to this purpoſe. There is, however, no particular mechaniſm, fitted for the exerciſe of this Senſe alone, which by peculiar ſtructure and organization will admit of this Perception. It has the ſame formation with the reſt of the body in this reſpect, and is capable of many other offices. Notwithſtanding this, it muſt be conſidered as an Organ of this faculty, we receive information from it, of the ſhape, figure and extenſion of bodies that preſent themſelves. There are many other circumſtances too, and ſome very incredible, with which we become acquainted by this means. There have been ſo many inſtances, of the diſcovery of different colours, by perſons who could uſe no other ſenſe for this purpoſe, that the fact is now placed beyond a doubt, and the ſurprizing feats of blind people,

which may be every day obſerved, will convince us that this Senſe has a great acuteneſs as well as being the author of a conſiderable extent of information to our Minds.

LET us now examine how it acts, in order to produce theſe effects. It is the ſurfaces only of different bodies which become the peculiar objects of its attention; and by theſe, we in ſome meaſure derive information of their ſhape, figure, and ſituation. But how is this done? If the body was juſt preſented to us, we might indeed in ſome meaſure perceive an effect; but in that caſe, we ſhould be ſenſible of mere Reſiſtance only. This Reſiſtance however would create in us neither a ſenſible Pleaſure or Pain, and it is hardly to be conceived, how even an Irritation could be produced. But we muſt conſider in this place that it is mere Reſiſtance, endued with no active power, and which indeed is ſo ſlight as that it may not excite even this Affection.

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We cannot however diſtinguiſh a true Perception, or diſcover the leaſt configuration of parts without Motion; and the Motion which is neceſſary in this caſe is very particular, as we ſhall ſee when we come to conſider the other Organs of Senſe. It ſeems to depend on a voluntary Action, ſuch an one being almoſt neceſſary to produce it. Objects in this Organ do not obtrude themſelves upon us, and demonſtrate their figure whether we are deſirous of it or not. But we examine them to find it out, we excite a Motion in theſe parts which act again upon us, and cauſe ſuch an Irritation as makes us acquainted with this quality. It might be imagined that Touch aroſe from a ſucceſſion of Reſiſtances, but the whole of this Perception does not depend on this alone; for if that were the caſe, we could not diſtinguiſh it from a ſimple Senſation, and the variety of figures could not be at all diſcerned. There is the ſame ſucceſſion of Reſiſtances in a ſpherical, as in a cubical body of the ſame dimenſions; but we

know how to diſtinguiſh them from one another. There muſt be ſomething then of agreement, in the Body itſelf, and our Organ, by which this Senſe muſt be determined, and although it is formed originally upon a Reſiſtance from Irritations, yet that is not ſufficient to cauſe the idea we have of bodies from this Perception.

THE Perceptions of this Organ ſo nearly reſemble our common Senſation, that it might almoſt be called an inſtrument of that Affection. By means of it, we not only perceive the various ſhapes of bodies, but have a high degree of Senſation from it, and it is capable of affecting us with ſenſible Pleaſure and Pain. Every one from experience will find, that the handling of ſmooth bodies, with equal and regular ſurfaces, and eſpecially thoſe that yield to the Touch, as velvet, &c. give a very pleaſing and agreeable Senſation. This depends too upon that principle on which we derive the origin of this Affection, the

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overcoming a Reſiſtance that is made to the general Action of the ſyſtem. In the ſame manner, bodies whoſe ſurfaces are rugged and uneven and without poliſh, affect us with a high degree of Pain, and I think I have heard of convulſions of the nervous ſyſtem produced from this cauſe. Upon this principle it is, that the different Affections, which hardneſs and ſoftneſs likewiſe in bodies occaſion, muſt ariſe. Theſe have been conſidered as qualities in bodies of very great conſequence. They are peculiarly founded upon Reſiſtance, and upon this account the Organ at preſent under conſideration might be eſteemed an inſtrument of Senſation.

BUT there is very great intellectual Pleaſure or Pain, to be derived likewiſe from this Senſe, and this has been the occaſion perhaps of forming an Analogy with ſome peculiar circumſtances of moral beauty. It is evident to every contemplation, that the handling of ſmooth as well as round bo-

dies is a fund of very great ſatisfaction to the percipient Power, whilſt thoſe that are rough, uneven, and angular, are peculiarly diſtaſteful. This inſtrument enjoys a peculiar delicacy in this reſpect. Variety may be borne by the Eye, whilſt it conſtitutes beauty, and diſcord may pleaſe in muſic, whilſt it is productive of harmony. But to the Touch, the leaſt kind of roughneſs that interpoſes in a ſmooth figure is the cauſe of great uneaſineſs. The reaſon of this ſeems to be that the Mind is more confined in this Organ than in any other. It is a very ſmall ſcope that is allotted to the Touch for its exerciſe, and the ſucceſſion of Ideas which proceeds from it is very ſlow. Whereas in the other Senſes, there is a vaſt field which they can review inſtantaneouſly, or attend to in a moment. The ſucceſſion likewiſe with which bodies are preſented to us in them, is ſo quick, that many are paſſed over without attention, and we are captivated only with the prevalence of thoſe that are agreeable, or the contrary.

WE may explain the cauſe of this Pleaſure and Pain by analogy from the ſame ſource as we did thoſe of Affections, when produced by Senſations. The one is an action of the body, while the other more particularly belongs to the mind, we perceive a body with eaſe that is ſmooth round and has a little irregularity in its ſurface; but rugged and angular bodies are not eaſily perceived, becauſe from their unevenneſs they offer many Reſiſtances to the power of the Mind in conceiving exactly of their nature.

SECT. II.

Of Taſte.

THE world hath branded the Perceptions of this organ with a very powerful opprobrium, as what brutes enjoy in common with the human ſpecies,

ſpecies, and as leading very little to the uſe of thoſe internal abilities, which diſtinguiſh mankind. We have already conſidered Touch as an inſtrument very nearly allied to our common Feelings, and the general notions of Senſation, and yet notwithſtanding this as of great importance in aſſiſting our rational powers, and in ſome perſons as the ſole judge of what in others is ſupplied by their ſight. In this capacity indeed, the organ under preſent conſideration, is not ſo noble a faculty; but yet it excels it in this point, that its perceptions are more diſtinct from Senſations in general, and the Pleaſure or Pain that ariſes from it is more intellectual or perceptive.

IN the review of this organ, we find more diſtinct corporeal powers appropriated to it, than to the laſt we conſidered, and here it is that we begin to obſerve the firſt dawn of a particular ſeat of the Senſes. This is in the Head, the principal as well as moſt exalted part of our ſyſtem, and where all

all theſe organs, except that of Touch, are centred in a cluſter. From hence, it would ſeem to a Phyſiologiſt, whoſe views are never removed from his objects, as they lie before him; or rather to an Anatomiſt, who purſues no farther than his knife, that this part of the body was entirely adapted to the perceptive part of our conſtitution; that its form was calculated only to promote their powers, and protect them from danger; and that its various operations were deſigned for their uſe and protection. The reaſoning Philoſopher would not object to theſe opinions, did not he find from obſervation, that we are not to refer a general affection to a particular part of our conſtitution, but that a ſyſtem is eſtabliſhed, upon which the whole is to be maintained uniformly and regularly; and that the uſe of any particular parts, is not independent of others. That the origin of the nervous ſyſtem, does exiſt in that part of the body, where the organs of Senſe are placed, and that the nerves which communicate

municate with them, are derived immediately from the brain, are truths that no one will controvert. But yet there may be found very good reaſons for theſe facts, without making the one, in the leaſt dependent upon the other. The information that one organ receives from another, or the mutual aſſiſtance that is given to each from its neighbour, requires a vicinity alſo which no one will diſpute. We all know what aſſiſtance the organ of ſight lends to that of Taſte, in the choice and diſtribution of our food. If one had been placed in the lower part of the body, whilſt the other remained where it is, it will be evident the ſame advantages could not be reaped from them, as we experience at preſent. Beſides, it is highly neceſſary, that organs which give information of things around us, ſhould be placed in the upper part of the body; for there they have a greater field upon which they may exerciſe, and be more free and independent of other parts, which are deſtined more particularly

to

to execution. This opinion will be confirmed likewiſe, if we conſider the protection that this ſituation procures to the nervous ſyſtem. Exalted to that ſtation, it becomes more ſecure from injuries, and adopts theſe organs as its peculiar and more immediate guards. But waving theſe conſiderations, it was neceſſary the nervous power ſhould derive its origin from one fountain, and the Head ſeems the moſt proper for this purpoſe, without attending to the neceſſary ſeat of Perceptions. To conclude, however, I cannot help thinking that the organs of Senſe would have been equally as perfect, with regard to their own exerciſe, if they had been placed in any other part of the body, as they are at preſent, and that the nervous influence would be as inſtantaneous in the Foot as in the Brain, where it is now ſituated.——But to return to the Senſe, which is the immediate object of this Section. The exact ſeat of it is in the mouth, but whether it be confined to any particular part, or diſtributed

through

through the whole of this cavity, is uncertain. Some Phyſiologiſts have determined this affair in a very particular manner, and have given us deſcriptions of different parts where it is more or leſs exquiſite. They have not only done this, but have appropriated to theſe parts the variety of Taſtes which we perceive. It is not to our purpoſe to enquire ſo minutely into the ſubject; we ſhall therefore preſume, that the Tongue is quite ſufficient for this purpoſe, and although it has a very different uſe, yet it is by a power very diſtinct from this, by which it becomes capable of that effect. In ſuch caſe, it acts by a mechanical influence, and depends upon an effort of the Will. But here it is determined more particularly by ſtructure, and peculiar organization. It conſiſts of a number of ſmall ſecretory glands, terminating in papillæ, by which it conſtantly emits a liquid which is capable of diſſolving all bodies which are adapted to this uſe, and by that means of raiſing the diſtinct Perception which af-

fects us. Solid bodies are not the objects of this inſtrument, it is by neceſſity required that they ſhould be diſſolved and become liquid before a Taſte can be perceived in them. The uſe of this will be readily acknowledged. The objects of it are carried through our conſtitution, and pervade the ſmalleſt veſſels of our body. Beſides, bodies being brought into a ſoluble ſtate are more ſubtile, and of conſequence act more powerfully upon the nervous fibres. By this means, they are enabled to re-act, and create, in the manner we have deſcribed, the particular Perception. From theſe ſentiments, it might be concluded that Motion, or a mutual Action of a Stimulus and the animal Fibre, was neceſſary in this ſenſe. But we can bring a more clear and certain proof, from conſidering the immediate objects of it. And to this purpoſe, let us attend a little to the variety of Taſtes which we may obſerve produced, and enquire into their reſpective natures and qualities.

THERE

THERE is no ſubject, that can preſent to us ſo great a field of contemplation, as this; for almoſt every particular body conveys to us a new Perception. It has been attempted to reduce the whole of them to ſome particular ſtandard, and to eſtabliſh it upon this foundation, that all bodies by Analyſis may be reduced to ſome particular qualities. But it was not conſidered, that by this proceſs, they are entirely deſtroyed, and in conſequence of that, are deprived of thoſe peculiar marks upon which their Taſte was grounded. It is certain indeed, that from the mixture of ſome principles or elements in a particular way, the variety of Taſtes may be produced; but in what manner bodies are combined for this purpoſe, is very difficult to aſcertain. If this Perception itſelf could inform us of any thing in this way, it would become a faculty of the higheſt utility. But at preſent, we cannot expect much from this quarter, every man's own

feelings,

feelings, in an affair of ſuch delicacy, are not to become a teſt of the ſenſations of another, and perhaps we have much better authority by which we can judge. This will be an Analogy with the different artificial combinations and reſolutions of bodies, which we ſee produced in the univerſe. Dr. Grew, whom we before-mentioned on the ſubject of Vegetation, has divided Taſtes into ten different kinds, all diſtinct from each other, and has deſcribed the cauſe of each. But there is a prior diſtinction, which it appears to me, ought juſtly to be eſtabliſhed previous to what he has advanced. This would be a diviſion into the ſenſible and perceptive. Thus under the latter may be included, ſweet, bitter, acrid, ſaline, and aromatic; but warm, cold, aſtringent, pungent, and malign, more properly belong to the former. This is according to his diſtinction; but the whole of what he has advanced on this ſubject might be much improved. The Taſte of Aromatic is certainly not original or ſimple, and the ma-

lignant is entirely imaginary. The peculiar taſte of Salt, or what he calls Saline, is quite indeterminate, for every kind of Salt has a taſte particular to itſelf. If we conſider this properly, we ſhall probably find, that there are but three ſimple and original Taſtes of *perception* in nature. Thoſe of Senſation muſt be included under that general notion, muſt be conſidered only as inſtances of that affection, and referred to that part of our Treatiſe——The three ſimple Taſtes of Perception, are a Sweet, a Bitter, and a Sour or Acid. And from theſe I think it may be very eaſy to determine the nature of the reſt, however altered and compounded by the various mixtures and combinations they undergo. We can perceive theſe principles in almoſt all bodies, and where theſe teſts are taken away, we have ſome other eaſy proofs of their preſence and exiſtence, which we ſhall endeavour to demonſtrate.

I. THE

1. THE firſt that we ſhall examine is the Sweet Taſte: This reſults from a ſaccharine principle, or ſugar, which reſides in almoſt all bodies we are acquainted with. We all know that ſubſtance, which is generally called Sugar, the production of a certain Indian plant, extracted from it by art, and preſented to us in its own peculiar form. In this appearance indeed, it ſeems to be ſomething ſui generis, conveys an idea to our minds that is peculiar to itſelf, and reſembles ſomething of the higheſt degree of ſimplicity. But yet perhaps, if we make a chemical reſolution of it, it will be found more complex and mixed with a variety of other matter.

IN the firſt place, common obſervation, as well as experiment, will inform us, that it partakes of the nature of ſaline bodies, that it enjoys a great degree of activity from this ſource, and that it forms very evident Chryſtallizations, the moſt certain mark of that claſs. But it is not a Salt of that

kind which we call neutral, it muſt rather be ranked under a ſpecies of that ſort which take an earth into their compoſition. This is evident to experience as well as this reaſoning, that it is a vegetable production, where no other can form the part of thoſe beings of nature. The Salt that moſt probably incorporates with this ſubſtance, is an Acid. This gives it all its activity; without it, it is inert, ſluggiſh, and devoid of all other properties, but what it enjoys in common with other parts of Matter*. There is another ſubſtance, which we may perceive equally evident in Sugar. This

* The compoſition of fixed Salts, is made in this manner; an Acid, which is always neceſſary to their formation, is mixed with a Salt of a different kind, viz. an Alkaline, and it forms a Neutral, a body that partakes of the properties of neither of the originals which compoſe it; but when it meets with a terreſtrial ſubſtance, which it does not only in the bowels of the earth, but in plants which are extracted from it, it forms an earthy Salt, and when it meets with a metal, it forms a metallic one. Theſe are all the fixed Salts in nature that have been as yet diſcovered.

This is an oily principle, which gives it an unctuous and ſaponaceous quality. Theſe three combined, an Acid, an inactive Earth, and an Oil, conſtitute the baſis of this ſubſtance, and are the foundation of its action upon the human body, and the means by which it occaſions the Taſte of ſweetneſs, which is obſervable upon the Palate. The acid gives it activity, by which, after it is diſſolved, it excites an Irritation in the tender Fibres of the Tongue. But the Earth is ſo intimately blended with it, as to deprive it in a great meaſure of its active properties. By this means, however, it does not become a medium between theſe two ſubſtances that entered into it originally, but appears quite of another nature. But yet it is not ſufficient to create that mild, bland and pleaſant Perception that is obſerved in the ſaccharine principle. This quality is ſupplied then, by the Oil, a ſmooth inactive ſubſtance that is calculated to ſheath and blunt every thing acrimonious that it meets with. In a review of the

Action, of this ſenſe, we ſhall find that neither of theſe ſubſtances act by their own power, either obſcured by one another, or in ſucceſſion; but as a new principle is raiſed by their commixture, it is that which occaſions the peculiar Perception.

THIS Perception of a ſweet Taſte, has always been acknowledged to convey to our Minds the idea of ſomething pleaſant and agreeable; and this is evidently more of the perceptive than of the ſenſible Nature. As ſmooth and without pungency it may be acceptable to common Senſations; but the particular idea it creates muſt ariſe from Perception. If in any caſe we are allowed to admit of the congruity of animal and vegetable ſubſtances, with reſpect to nouriſhment, here we have a large field to range in, and contemplate the Providence of God, when we conſider the final cauſe of theſe Actions. Almoſt every plant is endued with this ſubſtance, and the juices that contribute to its own nouriſhment are

always of this nature. But there is no exception can be made to that Matter from which we derive our ſuſtenance. That alone is fitted for this purpoſe, that hath it in the higheſt degree, and what differs from it, conſtitutes either medicines or poiſons. Mr. Margraaf of Berlin, has with the greateſt accuracy, illuſtrated this ſubject, by the moſt judicious experiments, upon the greateſt variety of plants. But we need go no farther, than a common ſurvey of our natural food. For Sugar is one of the principal qualities that enters into our bread, and is the ſole promoter of fermentation. A principle of ſuch prodigious advantage in qualifying every kind of Matter for this purpoſe. We might here enter into a large deſcant upon thoſe kinds of Matter which yield this ſubſtance, and account for their ſeveral Actions. In this we might not only enumerate an infinite number of Vegetables, but many Animals likewiſe, might be included in the liſt. We might alſo not only explain the more

ſimple Taſte from it, but might derive from this ſource many of the more compound and obſcure. But it is not to our purpoſe to enter too minutely into ſuch a detail, we ſhall therefore leave this ſubject to conſider,

2. THE Bitter Taſte: This may be more highly compounded, than the Sweet that we have deſcribed. Experiments indeed, have not been made ſufficient upon this ſubject, and a pure Bitter is what we ſeldom find, and is very difficult to be procured. Many of the bitter plants will admit of Fermentation, and no doubt will yield a Sugar by proper experiments; hence we preſume that this conſtitutes, in ſome meaſure, a part of their compoſition. Whether it is a Sugar in the mixed form in which we ſurvey it ſeparate, we ſhall not inſiſt upon, but that many, if not all, the conſtituents are found in it, is very certain. Thus it was obſerved by Grew, that both the properties of Sweet and Bitter might exiſt in the ſame Plant; for he took notice that thoſe

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Vegetables, whoſe roots are ſweet, gave bitter leaves; and that the Fig-tree, which bears a ſweet fruit, bleeds a very bitter milk. The cauſe of the bitterneſs, however, ſeems to be an alkaline Salt, which is intimately mixed in the conſtitution. This Salt is in itſelf, perhaps, a Bitter, though different from what we find in Vegetables. But yet bitter Plants in general may be called Alcaleſcent, and this property may be ſo combined and obſcured in their conſtitution, that like a Sugar in a compound Taſte, it is not perceived, as it would have been ſeparate and unconnected. There is an Acid likewiſe evidently exiſting in ſuch Plants as contribute to a Bitter, and may conſtitute a principle of this Taſte; but it is ſo obſcured by the alkali, that its properties cannot appear ſeparate. An Earth may often give ſtability to the ſubjects of it, and an oil may in ſome meaſure take off an Acrimony which otherwiſe might prevail. The Perception that is produced upon the Tongue and Fauces, by bitter ſubſtances

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as it is almoſt oppoſite from what we mentioned before, ſo the affection with which we perceive it, is of the reverſe to that of a Sweet. Theſe ſubſtances are endued with a greater degree of activity, have leſs of an Earth to obſtruct this property, and much leſs of an Oil to render them ſmooth and bland. In conſequence of this, they are endued with very great powers, and excite a high degree of Irritation. No wonder then, if from theſe principles they become the ſource of a diſagreeable idea. This experience almoſt always prove to be the fact, if they have a high degree of bitter; but if indeed in ſmaller proportion it may more eaſily be overcome *; and then they become pleaſant and agreeable. This ſhews that the Pleaſure and Pain of Perceptions, depend upon ſomething more than the objects, and that by uſe we gain a habit of expelling what was before too violent

* This is the caſe with red wine and olives; nay, even a collection of bitter Plants made into a decoction may at length become agreeable.

lent, and gave us uneaſineſs. But beſides this, a bitter Taſte is very often accompanied not only with pungency, but with an aſtringent power, and here it becomes the cauſe of a ſharp Pain, which belongs to the head of Senſations. As in a ſweet Taſte, ſmoothneſs gave us a pleaſure of this kind, ſo here the roughneſs we perceive, is the occaſion of the uneaſy feeling. Another obſervation we may make upon this ſubject, is this, that as ſweetneſs reigned in the greateſt number of thoſe Vegetables which contribute to our preſervation and nouriſhment, ſo this quality ſubſiſts in thoſe that have a leſs affection to our conſtitution, is a conſtituent of very active medicines, and often a principal ingredient of poiſonous ſubſtances.

3. OF the Acidity that we find in objects of Taſte, we can ſpeak more particularly, certain, and preciſe, than of any other quality. This property, if purſued to its utmoſt extent, and examined with the greateſt

greateſt ſkill, has never been divided into a more minute ſubſtance; and from hence it ſeems to be the moſt ſimple of any we know in nature. There are indeed different kinds as well as degrees of it; but theſe vary more in the effects they produce upon other material ſubjects, than in the mode by which they influence the organ of Taſte. To that they all contribute in the perception from which it is denominated, and differ only as more highly concentrated in themſelves, or mixed and combined with extraneous matter, which weaken their efficacy. We may preſume then, from this reaſoning, that an Acid is a very ſimple Taſte, and perhaps the moſt ſo of any we know. We may likewiſe proceed another ſtep, and conſider it as the baſis of every other. We have already ſeen, that it enters very much into the compoſition of thoſe, we have already examined, the Sweet and the Bitter, the moſt ſimple next to this. From hence it is eaſy to infer that other Taſtes, which are only combind and made up of theſe, admit

mit of its preſence in ſome degree. If we can rely in any meaſure upon a chemical analyſis, we ſhall find that all bodies which can affect our Taſte, yield it upon diſtillation. How this is procured, however in in that proceſs, is not to be aſcertained, let us rather wave this proof, and judge of it by a more faithful deciſion.

THE chief ſubjects of Taſte which we make ourſelves acquainted with, are the vegetable Tribe, and in theſe we can admit of no exception to the formal appearance of this quality, at ſome time or other of their growth, or in ſome part of their ſubſtance. But all ſubjects of Taſte are not vegetables, we perceive very diſtinct notices of this quality from animals likewiſe. Animal fleſh conſtitutes a principal part of our food, and upon this account is brought under our cognizance. And we find it not only capable of effecting this organ of Perception, when pure, uncorrupted and fit for nouriſhment, but much more powerfully

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in a ſtate of putrefaction, when this diſpoſition is deſtroyed. The Taſte however is very different, not only from an Acid, but from the other ſimple Taſtes we have mentioned. This would ſeem to be an objection to the univerſality of this ſubject of Taſte, if we had not experiments to convince us of the contrary, and very good reaſons to ſuppoſe that it does exiſt in animals, if not in a formal, yet in a concealed manner.

IT is well known, that moſt of the animals of which our food is compoſed, ſubſiſt entirely upon Vegetables, and thoſe in a young and living ſtate, when they contain a very high degree of Acidity. From hence it may with juſtice be concluded, that this ſubſtance muſt in ſome meaſure be blended in their conſtitutions; and that notwithſtanding we never diſcover a Perception like that of an Acid upon our Palates, it may really exiſt there, and give that zeſt which we ſo powerfully experience from our food of this nature. If, as we have

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determined before, this ſubſtance is a principle ingredient in the Taſtes of Sweet and Bitter, it is not in the leaſt degree improbable, that it ſhall occaſion what we find in animal fleſh. If the Palate was to be a judge of either of theſe circumſtances, I am afraid we ſhould be at a loſs to determine, whether it exiſted in one of theſe more than the other. But we muſt confeſs, that it is more eaſily evolved from the ſubjects of thoſe Taſtes, the vegetable ſyſtem, than from the animal conſtitution. However, many animals are found to yield both theſe Taſtes in ſome part of them *; and from hence we may bring a collateral evidence of the univerſal exiſtence of this ſubſtance. But we have a much ſtronger proof of the exiſtence of an Acid in animal bodies, than any we have yet adduced; and that is, the conſtant degeneracy of Animals

* We may give for inſtance Gall as a Bitter, and Milk for a Sweet, without conſidering ſome peculiar Animals of the lower claſſes, which are diſtinguiſhed by even theſe Taſtes, as the Locuſts, &c.

mals into Acidity. This may be neceſſary perhaps in ſome ſtage of every putrefaction; and may be always diſcovered at ſome time or other of this proceſs—But if the means of a very quick putrefaction are in any meaſure prevented, by placing the ſubſtance in a cold and damp ſituation, we always find a high degree of Acidity, and ſuch as is very ſenſible to the Palate. Beſides this, the conſtant tendency in ſome ſubjects to produce an Acid in the ſtomach, even from animal food, and the aceſcent proceſs of Milk are, I think, very certain and unerring proofs of the exiſtence of this ſubſtance.

FROM the whole of this reaſoning then, I think, we may ſafely conclude, that an Acid is the baſis of all Taſtes, and that the reſt are originally produced by the combination of this property, with ſome more inert ſubſtance. It may ſeem a paradox, that from the variety of two ſubjects there can be more than three produced; the two that

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are quite ſimple when ſeparate, and the third when they are joined together. But this proceeds from a too mechanical view of nature. If we examine it by the teſt of experiment, and the true nature of combination, we ſhall find that bodies by this means, when joined, alter entirely the properties of each other, and become a diſtinct ſubſtance from either. Two bodies joined, make a third; this third, added to one of the others does not appear as having one increaſing in power, but acts as a fourth quite diſtinct from either of the reſt; add again the other body, it becomes a fifth, two of theſe fifths make a ſixth; two of theſe a ſeventh; and ſo we may proceed almoſt to infinitum. After we have done this, we may ſubdivide them again, and form more combinations from that diviſion. Let us borrow a little, in order to illuſtrate this ſubject, an analogy from the formation of words by the two firſt letters of the alphabet in this manner, 1. A. 2. B. theſe may be ſuppoſed as two ſimple bodies,

we join them together, and they make a compound as AB. we compound that with the firſt, and make the word ABA. with the ſecond ABAB. then we begin again, and make ABABA. and ABABAB. In the ſame way, we may divide theſe into ſeveral others; we take the fifth for inſtance, and divide it into three words, as BABA. BAAB. and BABAB, &c. If we ſuppoſe that bodies may be joined in this manner, and have different effects, as theſe words have in pronunciation, we ſhall then ſee what a vaſt variety may be derived from two ſimple ſubſtances only. Theſe may moſt probably be imagined to be one ſimple active one, and another equally as ſimple, but quite paſſive; but what either of theſe are, no one can pretend to determine, and it is beyond the art of man perhaps to conjecture. Of this, however, we may be ſufficiently certain, that an Acid is a body the moſt univerſally active of any we know, and is the reſult of the higheſt exerciſe of the art of Reſolution. Farther

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diſcoveries may find this compounded of more minute ſubſtances, and we may go on for ever before we find the moſt ſimple bodies. The ſtudy of Chemiſtry, by which this muſt be elucidated, is as yet but in its infancy. Perhaps, when intereſted views are abandoned, and the ſpirit of enquiry into this kind of knowledge is better eſtabliſhed, we may then have clearer light thrown upon this ſubject, and be able to declare with confidence, of what at preſent we are but juſt able to conjecture. In this ſituation we muſt leave it at preſent, in order to enquire into the nature of Acid with reſpect to our Perceptions.

* IT is not worth while to mention the general method of its acting upon our conſtitutions. It is certainly endued with a high degree of activity, and excites in conſequence of it very violent Irritations. It ſometimes occaſions moſt acute ideas of ſenſe, and is often ſo violent as entirely to

* Vide Eſſay on Medical Virtues of Acids.

deſtroy the animal Fibre. It would be needleſs after this, to aſk whether we perceive it as agreeable or the contrary. It is only in a low degree, that we can take in any perception of it, and in thoſe caſes our ideas of it depend very much on the ſtate of our bodies and the nature of the ſubject. In general, the common, though ever ſo much diluted, occaſions rather an offenſive than agreeable perception, we loath and are averſe to it. But it is worth obſervation, that as when violent it affects our Senſations with Pain, ſo when not too ſharp it is very agreeable to this affection. This is owing to an apparent cooling quality by which it relieves thirſt, with which it is endued, and 'tis to this effect we muſt always aſcribe this ſenſe. This perhaps is an inſtance then, in which we may ſhew the difference between our Perceptions and more original Senſations; and for a proof, we may refer to every one's own feelings upon this ſubject. What we perceive of an Acid is diſ-

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agreeable, but what we feel is the contrary. Is not this then a plain evidence how near theſe affections border upon each other; and of our ſentiments upon this occaſion, that Perception is eſtabliſhed upon an Irritation that is too quick to be perceived by ſenſe. For here it is evident, that when the body admits of this affection, it is ſo ſlight as eaſily to be overcome, and hence gives a ſenſe that is agreeable. In the caſe of Bitters, we joined a diſagreeable Senſation and Perception together; but then they proceeded from different qualities in the ſame ſubject, but this acknowledges the ſame quality, which differs only in the degree of power with which it affects us. The property of an acid Body, by which it removes thirſt, is a neceſſary effect of its Acidity, although it is an object of Senſation and not of Perception; but pungency and aſtringency, when they affect theſe diſtinct principles, are not neceſſarily joined to Bitters, but only accidentally as it were belong to them.

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SECT. III.

Of Smell.

THE organ or inſtrument of Perception, which conveys to our minds the notion of Smell, borders very near upon the laſt that we have mentioned, and the Perceptions we derive from each of them, bear a very great analogy to one another. This is often ſo apparent, that they are both imagined by ſome to be the ſame, and differ only in the parts of contact with the object. In the ſame manner it may be thought, as that Taſte which is on the top of the Tongue differs from that in the throat, ſo that which is carried into the noſe differs from the general Senſe, and makes it appear as a diſtinct organ. But this is certainly not the true ſtate of the caſe. Every one who conſults his own feelings, is willing to witneſs againſt it.

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We can eaſily perceive, that the Taſtes we enjoy in different parts of our mouths and fauces, have no reſemblance to different Perceptions, but are evidently one and the ſame, only a little altered in their degree of action. But the ſenſe of Smell appears to be excited by very different impreſſions, made upon a very different organ, which is affected by very different objects.

IF we examine into the ſtructure of the two organs, nothing can be more different in the human body, the one conſiſts of a number of glands, exhaling a liquid to diſſolve the objects that are received upon it; whilſt the organ of Smell is a membrane, covered with naked nerves, without any glands or ducts to convey a liquid from them. The means likewiſe of producing each of thoſe effects is very different, the perception of Taſte is moſt commonly made by liquid bodies, or reduced to that form; but the organ of Smell is fitted to receive impreſſions from thoſe of a

ſolid or dry texture; not indeed that it is inſenſible to liquids, but a ſolution is not neceſſary for this purpoſe. Beſides this, there is required a conſtant influx and reflux of the Air, to convey more properly the odours of bodies to their proper place; and for this intent, there are very long bony convolutions upon which the membrane is ſpread, contrived to make the Smell more univerſal, and to aſſiſt the acceſs of the Air.

As Taſte depended upon ſome particular qualities of bodies, by which that Perception was induced, in the ſame manner this organ requires ſome of thoſe minute qualities, though of a different kind, in order to promote its exerciſe. Thoſe qualities that are neceſſary to this Perception, are called odours. Qualities which are as univerſal in their nature as Taſtes, and allow of equal variety with theſe ſubjects. But Smell does not depend upon one ſingle circumſtance, as was obſerved in Taſte,

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viz. a difference in particular qualities, but admits of a property in bodies which may be called more general. This is volatility, or a diſpoſition in bodies to leave the ſubſtances to which they once adhered, and be carried off from them. This property depends again, upon a mechanical minuteneſs, to which the particles of bodies may be divided. The diviſion of which bodies will admit, is infinitely ſurprizing. For nothing is more common than to obſerve a maſs of odorous Matter, endure this property for a conſiderable time, fill a very large ſpace, and yet ſuffer no ſenſible diminution of its weight. This obſervation might induce us to imagine, that the odours of bodies are owing to ſome peculiar circumſtances, which reſide in their nature, and not to the minute particles which compoſe them. But we can have no Idea how great a mechanical diviſion, can be made in bodies; much leſs, have we any authority to maintain, that a mere quality conſidered as ſuch, and abſtracted from its

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ſubjects, can produce any effect at all upon our bodies. Fire or Light ſeem to be as much a quality of material ſubſtances, to be as minutely divided, and to extend their influence to as great, if not a more conſiderable diſtance than odours, or any other quality that we may ſuppoſe in bodies. The Sun is a body that has ſent forth its rays of Light to an immenſe diſtance, when compared with the extent of any other quality, and yet, we have no grounds to maintain that the rays of Light are not material, or that the Sun is conſiderably diminiſhed in its bulk. It is a very fatal error that mankind ſhould diſpute every thing that they cannot comprehend. All that the human capacity is able to effect, is, to refer to a few more general principles than what are evident to common ſenſe, although built upon that foundation. In this however we ſhall ſoon find ſomething or other that is unaccountable, and where we muſt put a ſtop to our reſearches. This is the caſe here: Becauſe human art is not

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capable of dividing bodies ſo minutely, as the odoriferous particles of them require, we deny that it is within the power of nature to do it. But the minute diviſion of bodies is not the immediate cauſe of their volatility. It only adapts and prepares them for this effect. Let us enquire therefore into thoſe circumſtances, which are neceſſary to remove them from their ſtate of reſt, and induce this conſequence to take place. We have already ſeen, that many parts of bodies have an abſolute activity, whilſt there are others that are more paſſive and inert. It is in the ſtruggle between theſe two, that all the effects in nature are produced. We have already explained the great Laws of Gravitation and Attraction from this Principle, and have carried it ſtill higher, by ſuppoſing the Paſſive to be deduced from the Active. This diſtinction will be of no conſequence here. We ſhall imagine ſome degree of combination to have taken place, and bodies to have become determinately endued with one or other of

theſe qualities. If in this caſe, two active and two paſſive bodies ſhould meet, no effect will be produced, they will remain in equilibrio, and a ſtate of reſt will take place. If two paſſive bodies, in the ſame manner, ſhould be oppoſed to one that is active, the ſame conſequence will alſo be induced. But if on the contrary, two active bodies ſhould entangle themſelves with a paſſive one, it is neceſſary they ſhould predominate, and give the communicated power, of which they themſelves are poſſeſſed. Upon this foundation we preſume to build our theory of Volatility, let us now endeavour to ſupport it by facts, experiments, and analogy.

IN the general maſſes of Matter which we may obſerve, the paſſive powers abundantly prevail; and hence that reſiſtance that is ſo common in nature. But in many other bodies, or particular parts of them, which are not ſo denſe, or, in our opinion, not ſo paſſive, as the Air, the active powers

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are more free, and Volatility takes place. Beſides this, the higher degree of reſolution we perform upon bodies, and the more minutely we divide their particles, we bring theſe principles more effectually into play. From hence it happens, that the moſt volatile bodies which we know, are thoſe that we have ſuppoſed the moſt ſimple in their nature, when diſengaged from extraneous Matter. Theſe are the ſtrong Acids, of which that which is drawn from Nitre affords a very beautiful inſtance; and within theſe late years, a ſpecies of the vitriolic or ſpirit of Sulphur is diſcovered to be equally endued with this quality.

LET us now apply this doctrine of Volatility, to thoſe particular qualities of bodies, which are called Odoriferous, and for this purpoſe, we muſt enquire a little in their nature. We have not arrived at ſuch perfection, in aſcertaining the particular diſtinctions of odours, as of Taſtes. The only Ideas almoſt that we have annex-

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ed to them, are from the modes by which they affect us with Pleaſure or Pain, as an agreeable Smell, or one that is offenſive; or elſe as borrowed from the affections of Taſte as a ſour Smell, an aromatic Smell, &c. Both theſe methods of diſtinguiſhing, are certainly improper; the firſt, becauſe it refers to the caprice and humour more than the judgments of mankind, and the ſecond, becauſe it borrows from another Perception. We muſt be content then, with diſtinguiſhing Smells from the ſubjects in which they are perceived. But it is not neceſſary in this place, that we ſhould enumerate the variety of theſe objects. It will be much more to the purpoſe, to endeavour to find out ſome general principles from which they proceed, and this may be eaſily done by conſidering ſome of thoſe bodies that are the moſt active in this particular.

THE moſt volatile Body that we know, we have already determined to be ſome of the

the moſt highly concentrated Acids, ſuch as Spirit of Nitre and Oil of Vitriol. Theſe are in every circumſtance calculated to affect our olfactory nerves, to cauſe very evident Irritations, and one would think upon theſe accounts, the moſt proper to excite the Perception of Smell. But they are too active and too ſubtile to become the objects of it, it is neceſſary a higher Senſe ſhould be excited by them; and, in fact, we find a very acute Senſation to be occaſioned. It will ſeem requiſite then, from this conſideration, that ſome Matter which is more paſſive, ſhould enter into the compoſition of that body which is deſtined for this purpoſe. The moſt odoriferous body that we are acquainted with, joined with Volatility, is a Salt of an oppoſite nature from an Acid, viz. a volatile Alkali; and this is moſt commonly obſerved to be an animal Production, and found but in very few Vegetables.

LET us conſider a little how it is produced in the Animal. It is in that proceſs which

which breaks down its conſtituent parts, and forms a new combination from what was before obſerved. In this new combination, we find no appearance of an acid principle; but that is no argument but that we may even account for this alkaline production from that ſource. Its formal appearance may be entirely deſtroyed, and a new one abſolutely produced, as we often ſee in other ſubjects. It is a common maxim, that alkaline Subſtances are the direct opponents to Acids; and ſo they are when conſidered as particular Species; but this will not invalidate our opinion, that the conſtituent parts of one may enter indiſſolubly into the compoſition of the other. If this is granted, as that an Alkali is the product of an Acid, we ſhall then be at no loſs to account for the reſt of the Odours, we may diſcover in bodies, and to which they adhere as ſubjects. We have already advanced, that the moſt odoriferous body is the volatile Alkali, and that this is an animal Production. But we muſt conſider,

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that the greateſt number of odorous Bodies are of the vegetable Tribe, and where we can by no means diſcover the prevalence of an alkaline Principle. In all theſe, however, we may find both an acid and an oily Principle. From this then, in ſhort, we are emboldened to conjecture, that the odours of Bodies in general, are occaſioned by a ſolution of their oils in a volatile Acid, and that the whole effect is brought about in the following manner: The Air is perpetually replete with acid Particles, and theſe are always in a volatile ſtate, the Body which yields an Odour, has likewiſe an Acid, but it is too much overcome by the oils to be any otherwiſe than latent, the Acid of the Air then joins with it, aſſiſts it in the ſolution of the oils, carries it up with it into that element by its Volatility, and when it meets with our olfactory Organs, affects them with the Perception of Smell. We need not explain here how this ſenſe is produced; it may eaſily be imagined, from what we have already laid

down. Every thing contributes to promote a high degree of Motion, in the minute Fibres of the organ, and in conſequence of that, to excite ſuch an Irritation as raiſes a perception of the object. The acid Particles of bodies, as we have ſhewn under Taſte, are infinitely active; and the means which are afforded for the acceſs of the Air, render them much more powerful; hence it is no wonder theſe effects are produced.

PLEASURE and Pain of the Perceptions, in this organ, are entirely adventitious, and depend ſo much on the particular objects from which they are excited, that we muſt enumerate the greateſt number of them to form any tolerable judgment of theſe affections. For this reaſon we ſhall therefore leave any conſideration of this kind to the ſuggeſtions of our Readers, and paſs on to another organ of much more importance in the ſyſtem.

SECT.

SECT. IV.

Of Sight.

THE Perceptions which we derive from Sight and Hearing, are more the objects of our intellectual capacity, than what we have already conſidered; and although, perhaps, they are not the inſtruments of the acute enjoyments of ſenſe, yet they are the ſource of all that Pleaſure that ariſes from our rational faculties. The firſt organ which we conſidered, viz. that of Touch, ſupplied in ſome meaſure the place of that which is the preſent object of attention, and no doubt was the ſource of great improvement to the mind. But Taſte and Smell have been conſidered as more entirely ſenſual, as ſolely determined by external objects, and as of very little benefit in communicating any notions to our mental powers, but what belong to the

immediate gratification of the reſpective ſenſe. As the Perception which we are now going to examine, is the moſt noble that we enjoy, as contributing to information and intellectual Pleaſure, ſo the organ in which it is excited is of a moſt exquiſite texture, and elegant workmanſhip. The Eye is almoſt a perfect piece of mechaniſm in itſelf. Simple, uniform and unconnected with any other, it comprehends the greateſt variety of objects, and performs the greateſt number of Motions. We need not enter into a detail of the different parts of which it is compoſed, or deſcribe every function of which it is capable. We ſhall attend only to the immediate cauſes of Viſion, the objects that give riſe to it, and the motions that are required to to produce it.

AT the firſt view of this organ and its different affections, it would appear as if no particular kinds of Matter were the objects of its exerciſe; but that it was rather depen-

dependent on the general qualities of it. Thus it might be imagined that what we judge of by this ſenſe, were Extenſion and Solidity, the primary qualities of Matter, or Figure and Colour, the ſecondary ones. But all theſe qualities, might exiſt for ever in bodies, and the Eye be conſtituted upon the ſame, or even more perfect principles, and yet no notion be conveyed to the mind about them. This we often experience in the dark, notwithſtanding that all theſe circumſtances ſubſiſt in the ſame perfection. It is neceſſary then, that ſomething elſe ſhould intervene, in order to procure this perception. And this we ſee is always the caſe. Light is abſolutely neceſſary for ſeeing, and it is only by bodies enlightened by the various modifications of this ſubſtance, that information is conveyed to our minds of them, by this organ. The nature of this ſubſtance, Light, has been much diſputed, and it has been queſtioned whether it is a particular kind of Matter, or only a quality belonging to it. In many

places we have mentioned particular qualities of Matter; but in all of them peculiar ſpecies only were intended. But here we muſt be more preciſe, and conſider Quality as ſomething to be abſtracted from the ſubject to which it belongs. That Light is not a quality of this kind, may be proved from its Action, for no quality can act without its ſubject, and that Light certainly is capable of acting, appears from its influence on the Perceptions we derive from it. Beſides this, every view of this ſubject will contribute to ſhew, that it is really a Body, entirely different from the objects we ſee illuminated by it, from which it may be abſtracted, and to which it may be reſtored at pleaſure. This may be proved from a variety of experiments, that may be made upon it. By theſe we may ſee, that it may not only be divided into peculiar parts, ſeparate from each other, but is liable to all the general and particular qualities which other kinds of Matter enjoy.

NOTWITHSTANDING this, however, it will be very difficult for us to confute the notion of Light as a quality of Matter; and although it may be granted, that there is a body which accompanies Light, and gives it the force of its action upon our ſyſtem, yet that ſtill it does not conſtitute the body itſelf, but is only to be conſidered as a property which neceſſarily belonged to it, in the circumſtances wherein we find it. This notion depends in a great meaſure on the fallacy of our Perceptions and Ideas. What is there, by which we can poſſibly judge of the nature of material Subſtances but our Feelings and Senſations, an action that is made upon our body by the impreſſions of other ſubſtances, and the reſiſtance that we are conſcious of in it. But in order to determine this queſtion more exactly, let us enquire, by what Affections we ought to judge of material Subſtances. Shall we give up the whole of it to Senſations, and make Perceptions no more ac-

quainted with them, than as it confirms our common Feelings? Or ſhall we, as in this caſe muſt be ſuppoſed by the common underſtanding of mankind, make Senſations judge of the ſubjects, and Perceptions to judge only of their qualities? But how fallacious ſuch reaſoning would be, is very evident, we have ſhewn that both theſe affections are brought about by the ſame mode of Action, and that they equally depend upon an Irritation of the animal Fibre. To confirm this, let us examine a little what would be the conſequence of ſuch arguments, if we refer them to the different organs that we have already mentioned. Thoſe bodies which we have found to be the cauſe of Smell, or of Taſte, would no longer exiſt diſtinct as ſuch, but would be reduced to a mere circumſtance or affection, that might belong to any kind of Matter whatever; whereas we have ſhewn that the moſt perfect bodies in nature, appear to us under that form, which the moſt perfect Taſte repreſents.

SIMPLE

SIMPLE Matter is ſo involved in its qualities as they are very improperly called, that we ſhall never be able to form an accurate judgment of it. Thus Extenſion and Solidity, without which our Ideas of Matter muſt ceaſe, are called Qualities, as well as Heat, Light, &c. The only diſtinction which is made between them is, that the one ſort are ſuppoſed to be primary and neceſſary, the other ſecondary and contingent. But I would beg leave to think, that the ſecondary qualities as eſſentially belong to particular kinds of Matter, as the others do to this Subſtance in general; and what is ſecondary to body in that general view, is primary perhaps to others, which can no leſs exiſt without it, and where the former cannot be perceived. An inſtance of this we may give in Light, the body now before us, where we are not in the leaſt ſenſible of Solidity or Extenſion, but we are evidently conſcious of its ſecondary quality, which in this caſe becomes primary, is enabled

enabled to act upon us, and is as much Matter as any other with which we are acquainted. I cannot comprehend rightly this distinction of qualities into primary and secondary. It very much puzzles the subject, bewilders the imagination, and leads to Scepticism. Matter, when considered according to its qualities, is only an assemblage of them, and independent of their influence is nothing; and qualities are nothing but a term by which we distinguish the particular kinds of Matter from each other. Would it not be much better to distinguish Matter not by its qualities, but by its forms? This would give much more stability as well as truth to our reasonings, would place the secondary qualities upon their proper foundation, and make them more clearly understood than they are at present.

To confirm these arguments, it may be necessary to examine them, by means of our senses, and see how it is, that these organs become acquainted with different kinds of

Matter. By our general feelings or ſenſations, we judge of reſiſtance made to our body; by our Touch we diſcover, that this is made by a ſolid body; by our Taſte we diſcover that it is acid. But does not the latter inform us as much of the exiſtence of Matter as any of the others. They acquaint us with its general form and contents, but the other informs us of that peculiar kind of Matter, which affects us, and inſtead of being leſs inſtructive, it is more accurate. There may be a difference however pointed out in this reſpect. Our firſt Ideas of Matter ariſe from reſiſtance, the information we receive from Touch confirms this; but that of Taſte gives a new Idea of its own. Beſides, the ſenſe of Touch, lends its aſſiſtance to confirm more particularly the idea of Solidity, which is the immediate object of it. But the other Perceptions, confined to their own objects, only give information of the ſecondary qualities or particular forms of bodies. From this circumſtance then it is, that becauſe

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the idea of body, as ſolid or extended, is not immediately ſuggeſted, that we have room to imagine that it is no body at all that is preſented to us. But theſe are not ſuch determinate marks of Matter, but that they may ſeemingly be obliterated, and if any other quality of body ſubſiſts, ſuch as a power of inducing Action, I think it will be ſufficient to determine its preſence.

BUT to return to our proper ſubject. In our conſideration of Light, as a particular kind of Matter, or as a body diſtinct from every other; we muſt ſet up our Perceptions as a ſtandard of this knowledge, and muſt be obliged to make the organ of Sight, to be as true a teſt of it, as any other means that can be employed for this purpoſe. But we muſt ſupport our arguments upon this foundation, that the beſt means we have of judging of Matter, is by a power in it of irritating the animal conſtitution, that our common feelings or ſenſations judge of the force of the action, and that

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our Perceptions determine the peculiar kind that affects us. The organ of Senſe now under conſideration, is the moſt extenſive in its views of any other, as it can form an idea from the abovementioned proceſs, of the general form, and ſhape of every body. But the peculiar kind that affects it, and which creates an action in the organ, is ſomething very different from the bodies which it ſeems to ſee. Theſe bodies never come within its view, but it is the Light which envelops their ſurfaces, and which ſtrikes upon the Retina of the Eye that creates what we call Sight. We ſhall now endeavour to examine a little more particularly into the nature, properties, and different modifications of Light; by which we may perhaps confirm our former reaſonings, and be more ready to explain the different actions which it excites.

IT is very natural for the major part of mankind, accuſtomed to reaſon, in the formal manner of the ſchools, to think it neceſ-

neceſſary when we are going to explain the nature of any body, to determine its ſhape and figure and demonſtrate its Solidity and Extenſion, thoſe neceſſary attributes of material forms. We ſhall examine therefore theſe qualities, and ſee in what reſpect Light may be acknowledged to be endued with any of them. In the firſt place, with regard to figure, it is impoſſible we ſhould judge of that which belongs to this ſubſtance, becauſe the ſenſe which diſcovers it in any other body, becomes acquainted with it by means of this ſubſtance alone. It appears to be a mould in which all other figures are caſt, or a cloathing which covers every part of them, and upon theſe accounts can have no determined ſhape of its own. Neither when it is abſtracted from bodies, can we ever pretend to aſſign to it any peculiar form or conſtruction. In the next place, Solidity, a property upon which forms are of neceſſity founded, can never be demonſtrated to be in Light. This quality is determined by our Touch as well

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as by our Sight, but we can never pretend to ſay that Light is determined by that teſt. It is the object of this organ alone, and can bring no other to corroborate that evidence. It might be imagined however, that if we would allow diviſibility to be a teſt of Solidity, we might eaſily diſcover this quality in Light. Sir Iſaac Newton was the Father of this kind of Philoſophy, and diſcovered many hidden treaſures of this valuable ſubſtance. But he himſelf might be deceived if he ever thought he divided a ſimple and ſingle Ray of this ſubſtance in his optical experiments. For how many might be included in that ſpace which he brought under his inſpection, is impoſſible to ſay. We have no proof therefore of its Diviſibility, nor in conſequence of Solidity from this ſource. We have nothing to confide in upon this ſubject, but this common reaſoning, that if it is a body, it muſt be endued with Solidity, becauſe we have no notion of a body's exiſting without this eſſential and primary quality; or from another

ther property as eſſential to Matter as this, which we are going to conſider.

THIS is Extenſion, of which no one can in the leaſt doubt but that Light is poſſeſſed in a very eminent degree. Perhaps in this quality, it exceeds every other body in nature, and yet from this ſource, if it was not for the conſequent Action it produces, Light might be conſidered as a ſecondary quality. But it is neceſſary, that for this purpoſe, it muſt be abſtracted from the body to which it ſeems to belong, and the whole ſpace between our Eyes and the body muſt be filled with it; for unleſs this was the caſe, the body itſelf muſt ſtrike upon the Retina, to create viſion, and not the Light that proceeds from it. This is a high proof then of its Extenſion; and from this we may eaſily deduce its Solidity, becauſe the one almoſt neceſſarily implies the other. Having then ſhewn that Light is poſſeſſed of the primary and eſſential qualities of Matter, let us now proceed to

examine

examine its particular nature: In order to do this more completely we muſt conſider its production.

THE great connection which is often obſerved between that power which affects us with Heat, and that which produces Light, has led many to imagine, that they are both the effect of the ſame principle. Thus it has been taken notice of, that Light conveys ſometimes a degree of Heat, and on the contrary, that Heat is much oftener accompanied with Light. The anſwer that has been given to this ſuppoſition, is what is very obvious at firſt view of the ſubject; that they do not always accompany each other, but that they are as often ſeparated as connected, and that where the greateſt Light is evident, no Heat is perceived, and where the moſt intenſe Heat is acknowledged, Light is not in equal proportion. That method of reaſoning, which conſidered theſe ſubſtances, as mere qualities only of Matter, was an error that un-

avoidably miſled thoſe Philoſophers who have attempted the examination of this ſubject. We have already endeavoured to prove that what produces Heat is a body, and that the Matter of Fire is the moſt univerſal and general of any other kind, that it enters into the compoſition of all others, that it is evolved from them by Motion, and in this exit it occaſions Heat. We are now to examine into another body equally as ſubtile, but not ſo deſtructive. It acts only upon our conſtitution, and that of Vegetables, and although we experience from it ſomething very different from Heat; yet we may indulge the ſuppoſition, that both the effects proceed from the ſame cauſe. Let us to enforce this argument, draw a compariſon between them from a few of thoſe influences, by which each are produced.

1. THE firſt and moſt common production of Light is from the Sun, which is continually emitting Rays from its ſubſtance, and enlightening all thoſe objects which

which are diſcoverable by our Senſes. This is its moſt common ſource, and in reſpect of its ſuperior influence, we may pronounce it the univerſal Parent of this ſubſtance. That it produces Heat likewiſe is equally evident, but it is from ſome very peculiar circumſtances that this is effected. Theſe may depend perhaps upon the condenſation of its Rays in the common atmoſphere which ſurrounds us, whilſt, if left to themſelves, this effect might not be produced by it. We cannot bring a more beautiful inſtance of this, than in the great advantage we derive from ſpeculums. This piece of Mechaniſm can produce the moſt intenſe Heat, by an accumulation of Rays which are innocent when diſtinct, or even when reflected from other bodies.

2. A SECOND means of producing Light, is from the inflammation of burning bodies, and here no one will diſpute the preſence of Heat. But let it be obſerved that the greateſt Heat, in this caſe, is not obſerved where there is the greateſt Flame. It is

only a free expanſible vapour of bodies which admits of illumination, whilſt the body itſelf continues in a darkened ſtate, although heated to a much more violent and exceſſive degree.

3. ANOTHER means of producing Light is from certain bodies of a particular nature, which appear ſpontaneouſly covered over with an illumination in the dark. Theſe are of three kinds; the firſt natural concretions, in the bowels of the earth of a ſaline nature; the ſecond, the effect of a peculiar animal proceſs, which is obſervable in Glow-worms and many kinds of fiſh; and the third ariſes from putrifying Subſtances both of an animal and vegetable nature. In all theſe it muſt be confeſſed very little Heat is to be perceived, but yet that they all partake of it in ſome degree is equally certain. All ſaline bodies are found to contain a conſiderable degree of Heat when mixed with each other, and one of the moſt luminous is found to be a ſelenitic ſalt, a compoſition of an Acid and

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an Earth, and this Salt is the baſis of many warm ſprings. There are no Animals but what have ſome degree of Heat in them, and although the Glow-worm appears to us colder than our bodies, yet there may be ſomething in its conſtitution which may evolve its natural Heat more perfectly than in other Animals. The Light, which proceeds from putrefaction, in the ſame manner may be ſaid to ariſe from a degree of Heat, which may be obſerved often very violent in ſubſtances under that proceſs; or it may proceed from certain Animalculi of a luminous nature, that make putrid bodies the Nidus of generation.

4. A fourth manner of producing Light is by the power of Electricity. Of this indeed we have ſo few regular experiments, and ſo little has been advanced in a ſyſtematical manner upon the ſubject, that no juſt concluſions can be made upon it. We do not however find any great Heat, from what is called the electrical Fire, and yet it is poſſeſſed of many burn-

ing qualities. Theſe are moſt evident in the higheſt degree of Electricity, viz. in Lightning, whoſe effects in this way are well known. To the means of producing Light that have been already adduced, we may add ſeveral others, as the motion of Quick-ſilver in an exhauſted receiver, and the Trituration of certain bodies, in all which it is excited by one of thoſe means that likewiſe produces Heat and Inflammation.

WE have ſhewn then, a number of inſtances, in which we ſee ſimilar effects produced from the ſame cauſes, in ſome more violent, though in others leſs conſiderable. We muſt now enquire whether this reaſoning be ſatisfactory, and in what manner the different circumſtances are to be compared together. In moſt of the parallel inſtances we adduced, there was no proportion between the two effects, except in one, which indeed was the moſt powerful, viz. the Rays of the Sun, eſpecially when

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condenſed in a Speculum. Let us obſerve then the effects of that experiment, where pure Light is apparently brought to produce the moſt violent effects of Heat. This is done merely by condenſation, or accumulating of the different Rays together, and making them to act with a ſuperior force. In this caſe, Light is produced as well as Heat, but with this difference, that a body interfering, the Light is abſorbed though the Heat continues. From this it will evidently appear, that Light dwells upon the ſurface only, does not enter into the minute parts, and is to be referred to our ſenſes alone. Whereas the effect it produces upon bodies, though without that appearance is very violent. Again, Heat is produced in the ſtrongeſt manner in the moſt denſe bodies, and where there is the leaſt ſurface. Theſe circumſtances however, apparently ſo oppoſite to each other, are far from invalidating our opinion upon theſe bodies, which we ſhall now deliver more explicitely.

LIGHT and Heat are not be conſidered as different effects or qualities, but more properly as cauſe and effect. Thus Light is ſuppoſed to be a body that reſembles the moſt of any the Matter of Fire, which we imagined to be the moſt ſubtile and active in its nature. From this view we ſhall find that the different circumſtances may be eaſily explained. Heat is always found to be in proportion to the denſity of bodies, and this is becauſe the Matter of Fire finds greateſt reſiſtance, when this is caſe, and in conſequence induces the greater Motion; but as ſoon as it has reached the ſurface, the Heat leſſens, there is not ſo much inteſtine Motion perceived, and it puts on the natural appearance of Flame. This agrees exactly with the phænomena of Light. When Rays are accumulated they make a denſe body, and cauſe a heat, and in this caſe the illumination is not equal in proportion; and beſides, if it enter the body it occaſions as intenſe a Heat as any

other

other cauſe. In general, it dwells about the ſurface, and then it may be conſidered as a modification only of the Matter of Fire evolved from the body, only infinitely more active, ſubtile, and pure. From the whole of this it will appear then, that Light is the Matter of Fire, rarified too much to produce Heat, and that this quality often proceeds from Light, condenſed to a very high degree. The reaſon, perhaps, that we do not ſee Light and Heat correſpond to one another, may be determined by a variety of circumſtances; but particularly by this, that we cannot abſolutely aſcertain the exact degree of Heat that is excited in bodies, or that nature of the Matter of Fire, by which its more eaſily evolved from ſome bodies than it is from others.

IT may be objected to what we have ſaid, that ſuch a powerful active body as we have imagined Light to be, would be ſeen to produce very violent effects of its own accord; whereas it is innocent and harm-

harmleſs, both to our Perceptions and to other parts of Matter. This is owing entirely to a fallacy in our common obſervations; and beſides, does not correſpond with our method of reaſoning upon the the ſubject. Light is not ſo innocent, as might at firſt view be imagined, it acts upon us in a ſlow and determined manner, and riſes gradually from darkneſs to its higheſt luſtre. By this means we become enabled to re-act with eaſe upon the impreſſions that it makes upon us; but if we were to be tranſlated very ſuddenly from one of theſe ſtates to the other, we ſhould find this body infinitely more powerful, than we could ſuſtain. But waving every conſideration of this kind, we do not pretend to infer from what we have ſaid, that a ſtate of the higheſt activity is a ſtate of the greateſt deſtruction. This circumſtance muſt be determined from Reſiſtance, and this will depend on a combination with another body, whilſt the ſame activity ſubſiſts. Thus we find that Friction begets

Heat, not in proportion to the velocity alone, but to the quantity of Matter joined with it. Where activity is ſufficient to overcome the reſiſting Matter, which will be in proportion to denſity, the more powerful will be the effects, but where it meets with little Matter, it can have no poſſible effect. This will admit of very judicious reaſoning; for Activity, let it be ever ſo violent, can have no power but where there is ſomething for it to act upon, and thoſe bodies it meets with, when eaſily overcome, occaſion a leſs violent Action; whilſt in bodies that form a great Reſiſtance, if it is able to overcome them at all, muſt effect it with great power and force. From hence we may imagine that a deſtructive principle is not in the leaſt neceſſary to the Activity of any body; and this is the reaſon why Light is generally ſo innocent; and yet upon particular emergencies, it may become the univerſal deſtroyer of all nature.

NOTWITHSTANDING what we have ſaid, however, in this diſquiſition on the nature of Light, we may ſtill imagine, that as it appears to us, it is not that ſimple element which we may imagine the moſt pure in nature, but that it is in ſome meaſure a compounded body. The foundation upon which we ground this idea, is the diviſion we may artificially make of it into different colours, which lie blended in its ſubſtance. Whatever may have been ſaid concerning Colours as different Modifications of Light only; and that bodies are only poſſeſſed of them as they are diſpoſed to reflect particular Rays; yet I am ſtill of opinion, that there is ſomething very particular in their compoſition, that inclines them to theſe appearances. Colour is no more the object of Sight, than an Acid or any other taſte is the object of its peculiar organ; and I ſee no reaſon why peculiar mechaniſm ſhould influence the one, any more than the other. A juſt reaſoning,

ſoning, founded upon common ſenſe, inclines us rather to ſuppoſe, that there are certain parts of Matter which are endued with one colour, and others that are poſſeſſed of a different one; and the peculiar texture, which every body muſt have upon this account, has never been demonſtrated.

WE do not know what Matters may be mixed with Light, in its approach from the Sun to ſublunary bodies, and how upon the application of a priſm, it may be inclined to reflect the colours of each. Nor yet can we ſuppoſe that every thing that we ſee, are influenced by priſms, or any ſuch circumſtances in the air, as to make them put on their peculiar colours. At the ſame time, there is nothing incongruous in the ſuppoſition, that all bodies ſhall be induced by properties correſponding to their intimate nature, always upon the acceſſion of Light, to appear with a particular colour; in the ſame manner as they

offer a peculiar taſte, when preſented to the Tongue. In ſome caſes, we often ſee ſome particular kinds of Light, correſpond to thoſe other principles of bodies, and particularly in that effect of altering their colour. Thus, ſome experiments upon the electrical fluid, have diſcovered in it a quality very nearly approaching to an Acid. This has not only been perceived by the taſte, but by the change of the blue juices of vegetables into a red, the true teſt of this quality. No experiments have been made upon common Light for this purpoſe, neither do I believe that it poſſeſſes ſuch a power; but yet where we have diſcovered it, it is ſufficient to ſhew that other Matters are often joined with this body. Sir Iſaac Newton firſt made thoſe notable diſcoveries, concerning the diviſion of Light; and from hence it has been always held as an eſtabliſhed maxim, that Colours were Modifications only of it. His experiments were infallible indeed as far as they went, and carried with them the certainty of demon-

monſtration, with regard to priſmatical obſervations. But whatever extended further than this, was entirely conjecture; and notwithſtanding the Light taken into a priſm, and the colours refracted by it, obſcured or deſtroyed that which was natural to a body, yet it was no more than what every common Dye would do, where there is no influence of this kind. But at that time philoſophy was too mechanical, and all the qualities of bodies were attempted to be explained in the ſame manner. With juſtneſs and reaſon this method of philoſophy has been exploded in others, and it is hoped that in future time, ſome reigning principles will be diſcovered in bodies which ſhall determine their Colour alſo. At preſent, it would be inconſiſtent to offer even conjecture upon this ſubject, no experiments of any utility have been as yet brought to light, any more than as they reſpect particular arts, and the imaginations of authors are ſo frivolous that we muſt at preſent leave it in that obſcurity

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in which it is involved, and which by any further reaſoning of our own we might only ſerve to promote.

LIGHT then, being conſidered as a body of a very ſubtile nature, and very powerfully active; let us now attend to ſome of its effects on the human body. We need not in the leaſt doubt, but it is enabled to irritate the animal Fibre; both as it proceeds immediately from the object of its production, and as reflected from other bodies. In conſequence of this Action, a perception is induced, agreeable to our former notions of the origin of this affection. But let us examine a little more particularly the form of the organ on which it acts, by which it is adapted to this purpoſe, and the method by which theſe effects are produced.

THAT part of the Eye, where the Perception is immediately excited, is a membrane ſpread over the inner cavity or chamber of this body, compoſed entirely of nerves

nerves of the fineſt texture and moſt minute diviſions, and is of the moſt delicate frame of any part of our conſtitution. The Retina, the name which this membrane obtains, by this means becomes exceedingly well calculated for the acceſs of a very ſlight Irritation. But notwithſtanding this, Light is endued with ſo little force to excite an Impreſſion, that the Rays are obliged to be exceedingly condenſed, before they reach the immediate organ of Perception; but then by this means it enjoys a double advantage, not only in condenſing the Rays to make a ſufficient Irritation, but in taking in a very large picture, by which the greateſt variety of objects ſhall be perceived.

FROM theſe circumſtances then, we are enabled to explain the nature of Viſion, upon the principles which we have already laid down concerning the nature of Perception in general; but before we finiſh this ſubject, it is neceſſary we ſhould take

notice of two circumſtances, which have very much puzzled Phyſiologiſts, and muſt interfere with every theory upon this ſubject. Theſe are the inverſion of the object, and the impreſſion upon two organs at the ſame time. Many have been the conjectures how theſe are induced, but they have in general referred them to a principle too mechanical; I imagine there is no occaſion for this, and we may probably explain them with greater plauſibility upon the reaſons that we have laid down in this Treatiſe.

WITH regard to the former, it might ſeem at firſt view that as the Irritation is made inverſely, that the Perception ſhould correſpond to it, and be ſo likewiſe; but let us reflect a little upon this ſubject: We have already inſiſted much on a diſtinction between Perceptions and Senſations of this nature, that one relates entirely to the mode of Action, whilſt the other refers to the object likewiſe. If Seeing were a Senſation,

ſation, and it was by this Affection, that our judgment muſt be determined, no doubt but the object would appear to us as painted on the Retina, but as it is a Perception, that reaſoning will not hold good. For by this Affection, as we are not conſcious of the Action, but of the thing repreſented, we muſt judge of its ſituation, and of its diſtance, by ſome further act of the Mind. We can hardly ſay how it is children or even brutes perceive objects; but utility and long uſe will direct them to perceive things aright, although they have no intellectual faculties to form a proper judgment. For there is a great difference between a kind of natural judgment, that we may form with very little act of the Mind, and that ſuperior kind which requires the greateſt exerciſe of mental powers. It is by this means, moſt probably, that we attain to the knowledge of the diſtance and ſituation of bodies, and mere Perception ſuch as we have determined it, may be

imagined not to have theſe things for its object.

THE ſame reaſoning, however, will be very fallacious, if we extend it to double Viſion. The other was eſtabliſhed upon the Object, and not upon the Action, but this relates to both of theſe, and would be almoſt the ſame, if by Senſations even, we ſhould attain to the power of Perception. Every act of the Mind, of whatever kind it is, muſt be performed at a particular time, peculiar and confined to itſelf. Beſides this, the conſciouſneſs of every action, and the inſtruction of every body muſt be conveyed to us diſtinct, to make us ſenſible of them; and I imagine that ſucceſſion muſt always be perceived, in order to raiſe in us two diſtinct ideas. Where an object then offers itſelf to our Senſe in different parts of the body, if it is done at the ſame time, it will appear ſimple as it is; but if there is ſucceſſion in its Action,

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it muſt appear double, becauſe it conveys to our Minds two Ideas *. In common Viſion, we have one object preſented to two different organs at the ſame time, and it appears to be one for the reaſon I have above deſcribed; but if we interrupt the Rays of Light by interpoſing a body in ſuch a manner, as that it ſhall enter but one organ at a time, it will appear double, becauſe we create a ſucceſſion in the Perceptions. This is always done in thoſe experiments that are made to occaſion double Viſion. For in that caſe, a ſmall hole is made in a piece of board, by which a ſufficient number of Rays cannot come to both eyes at once, but are prevented in the one whilſt they gain acceſs to the other.

WE ſhall have occaſion to ſay but little concerning the Pleaſure or Pain that reſult

* This may be illuſtrated from another ſenſe, viz. Touch, by a very ſimple experiment, which has often been obſerved, viz. putting any body between our fingers, ſo as to make it touch in different points, and it will appear as if we had two bodies there.

from the objects, that are offered to our Sight. Every one is conſcious how great a ſource they are of theſe Affections, but yet they ſeem to be too intellectual for our preſent purpoſe, and to be determined by a higher power of our Mind. But we may experience from this organ ſomething of Senſation, and although there are few inſtances, where in the common occurrences of life, Light can produce any ſenſible Pleaſure or Pain; yet diſorder will ſo influence the Retina, as that an impreſſion on this body ſhall become entirely offenſive and affect us with very great ſenſible uneaſineſs. In this caſe, it is worthy of obſervation, that it does not act as Light, by creating too great a glare, but evidently conveys the idea of a Stimulus, or a body impinging upon us by a mechanical power. This is a farther confirmation of the difference we pointed out between our Perceptions and thoſe effects of which we become ſenſible; and beſides this, it is a proof of that remarkable Affection, either of our mental

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or corporeal faculties, which diſpoſes us to be more ſenſible of impreſſions at one time, than we are at another, and which makes ſimple Irritations to become violent acute Senſations.

WE have ſeen then that Light is a body, which in the act of Viſion irritates the Fibres of the Retina, and occaſions the Perceptions of objects illuminated by it. Let us now ſee if we cannot explain ſome other Phænomena of the Animal Conſtitution, from theſe, or at leaſt other principles of the ſame nature.

1. LET us endeavour to examine into the phænomena of Dreaming, a ſubject that has puzzled many of the beſt Phyſicians as well as Philoſophers. How it is that the Body be diſpoſed to that activity and vigour, which we always find it enjoy in a watchful ſtate, is not ſo difficult to explain, becauſe it appears to be the natural and original ſtate of Man; but how it is that we

come to put off that diſpoſition, to lock up all our Senſes, and involve ourſelves in a dormant inactive ſituation, is very extraordinary and remarkable, and is very difficult by any tolerable theory to inveſtigate. The final cauſe indeed readily preſents itſelf to us, viz. to promote our vital Actions, whilſt our ſenſible organs are lulled aſleep. But yet we ſee that even in this ſtate, a Phænomenon appears which ſeems to exerciſe very much our ſenſible as well as vital Actions. This is *Dreaming*, of which the beſt definition that can be given, is, that it is the apparent means of exerciſing our ſenſible powers, while the organs are deprived of any external impreſſions, and of their uſual faculty of acting. We think that we are in the poſſeſſion of every enjoyment of Senſe, and exerciſing the ſame profeſſions as in real life; whilſt the whole is an imaginary fiction, and we are engaged in no Action at all.

THE opinions of Philoſophers in all ages upon this Phænomenon have been many and various. It was a remarkable ſubject, and every one was deſirous of exerciſing his abilities and detailing his ſentiments upon it. It is entirely, perhaps, a ſubject of conjecture, and it is wiſely contrived that we ſhall enter but ſuperficially into ſuch diſquiſitions. If we take up the ſubject independent of any ſyſtem, and attempt to explain it from its appearances only, we ſhall be more liable to be deceived, than if we deduce it as a conſequence of the general Affections of our conſtitutions. For as an animal Action it partakes no doubt of its general principles, and acknowledges the ſame moving power as any other.

IT was an antient opinion, and one that has not been neglected by ſome modern writers, that this affection Dreaming was influenced by Dæmons, evil and good Spirits, who ſtruggled with one another, either

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to pleaſe and divert, or to torment and diſtract us in a ſtate, when our principal faculties were locked up and deprived of Action, and we were diſqualified to reſiſt or oppoſe their power. It is not our buſineſs to enquire into the nature and influence of theſe Spirits, but whatever view we take of their Action it muſt be conſidered as belonging rather to our mental than our corporeal faculties. The ſcheme that has appeared the moſt plauſible, and which carries the greateſt conviction along with it, is, the ſuppoſition, that it is the exerciſe of our mental Faculties, whilſt thoſe that are merely Animal are incapable of any Action. This reduces it to that involuntary power of thinking which every man enjoys in great perfection even when awake; and make the reveries of a man awake to be the ſame with the Dreams of a man aſleep. We ſhall offer ſome few objections to this ſcheme, and then endeavour to explain the method by which it ſeems to be produced.

1. IN the firſt place we may obſerve, that our Thoughts whilſt awake, if they are of this kind, are engaged in a particular train, from which we never deviate till the chain is broke by ſome unforeſeen interruption; and that it is only thoſe few who have ſpent the greateſt part of their time, in the moſt ſtrict ſtudy and contemplation, and that on moſt abſtruſe ſubjects that are liable to this Affection; but the ſame cannot be ſaid of Dreams, for nothing is more contrary to this, than the common mode of thinking that we employ in them, nothing more fleeting than their objects, and nothing more tranſitory than their purſuits.

2. IN the ſecond place, our Thoughts in deep ſtudy and meditation are not only regular and conſiſtent with themſelves, but they are conformable to the general informations of our Senſes. We can never, by all the Reveries that are poſſible, entertain

tain the idea that we are in different company than ourſelves, and that we are in the enjoyment of any ſcene of life, but what at that time we really experience. But in Dreaming, ſuch inconſiſtent ideas are perpetually obtruding themſelves upon us, and make the chief ſubjects of our contemplation.

3. IN the third place, the ſubject of ſerious Meditation and Reverie is moſt commonly ſome abſtruſe point of ſcience, and it is moſt likely that the Mind would always be engaged in ſuch contemplation, if left to itſelf; but in Dreams, the moſt light ſenſible and diverting ſcenes of life are repreſented. Solitude is pleaſing to a man in his ſenſes, and it is this perhaps that may dictate to him whilſt awake ſuch Thoughts as are moſt ſerious; but in Dreaming, Solitude is ſeldom obſerved, we are ſurrounded with variety of company, and it is gaiety and mirth, or elſe ſome moſt intereſting ſcenes that employ our attention.

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4. In the fourth place, we do not ſeem to have ſo high a degree of moral delicacy in our ſleeping as in our waking hours. But if Dreaming be a mere exerciſe of the Mind, abſtracted from the Body, one would think the contrary ſhould take place; for no man, let him be ever ſo much devoted to ſenſual objects, but ſome time or other has a regard to the affections of the Mind. And this muſt happen when moſt diveſted of objects of Gravitation, and moſt abſtracted from ſenſible powers.

5. IN the fifth place, bodily Affections and diſorders very much diſturb us in our Dreams, and the greater ſtimulus employed, as well as the greater velocity in the circulation, very much hurry and diſturb our Thoughts, repreſent to our Minds frightful and horrible objects, and raiſe the moſt tumultuous paſſions. This could never happen, if Dreaming proceeded entirely from an exerciſe of mental powers, be-

cauſe we often find, the greateſt tranquillity and eaſe of mind in thoſe perſons, who are the moſt diſturbed in their ſleep, and have the moſt affecting Dreams.

FROM theſe arguments it will appear, that the Mind in its ſeparate ſtate, is not ſufficient to account for this Phænomenon, but that ſome corporeal Affection muſt have a ſhare in the origin of it. The Body however in the moſt common caſes is free from diſorder, that ſhall affect us with pain, our Senſes are all locked up and diſqualified for uſe, we are ſenſible of no Irritations, and we perceive no peculiar Perceptions from any objects. How then ſhall the Body become capable of this effect? We have already determined that the ſenſe of Seeing is produced by Light, that this is a Body, and in conſequence of that circumſtance, it produces this Perception. But ſuppoſe any other Body was to affect us in the ſame manner as Light does, would it not convey the ſame Idea or Notion to our

Minds, that this Body did when it was preſent; for as we have no notion of Bodies but from the Ideas they convey to the Mind, whenever an Action ſimilar to what the Body occaſioned, ariſes, we muſt neceſſarily refer it to a cauſe of the ſame nature. Thus there is only one Body from without that can make an impreſſion upon the organ of Sight, and we are accuſtomed to no other, but if from any internal principle we ſhould perceive any thing in that place, we ſhould immediately refer it to the general object which cauſes Ideas. But ſimple Light conveys only one ſimple Idea; and this can make but a ſmall impreſſion: its more general Action is in reflection from other bodies, and though ſtill it acts as Light, yet it would convey no farther notion to the Mind, than that of this ſimple Body, unleſs we refer to a higher power of the Mind. We muſt bring in then the aſſiſtance of Memory and Judgment, to inform us of the particular ſpecies of beings, after the impreſſion is made upon the organ.

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Theſe acts of the Mind, rouzed by this power, produce from Recollection many of the fanciful ideas and odd circumſtances that we ſee produced in Dreaming; and this may be the cauſe why this affection is always an act of Reminiſcence.

THAT there is a Stimulus preſent in our Bodies at all times, is evident from the continual exerciſe of the circulating powers. Of this indeed in common cauſes we are never ſenſible, not even in our ſleep, but that we may have a Perception of the irritating Power, as the blood paſſes through the ſenſory organ, may be evident from this reaſoning. We have already obſerved that a greater degree of Reſiſtance is required to occaſion a common Senſation, than what is required for the Perceptions we derive from the organs of Senſe, and hence it is more eaſy to perceive than become ſenſible; and we may conclude, that ſimple Irritations may very eaſily, upon the leaſt Reſiſtance, be ſo heightened, as to be perceived

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in reſpective organs. Now we know, that the whole Circulation is greatly heightened in the time of Sleep, the Pulſe is quicker, the Reſpiration more uneaſy, and every Secretion performed in much ſhorter time. From theſe circumſtances then, why may we not imagine, that the blood paſſing through the Organs of Senſe occaſion, a Perception in them ſimilar to what was produced by their proper objects, and occaſion this Phænomenon? As nothing, however, can be more various than the the objects which are preſented to us, it is neceſſary that Memory ſhould in great meaſure ſupply their peculiar forms. This may ariſe ſometimes likewiſe from ſome accident, or unforeſeen circumſtance, which may make our Dreams ſo complicated and irregular, as we often find them.

As moſt of the objects which we perceive in Dreaming, are ſuch as belong more particularly to our Sight, we have choſen to give this diſcuſſion of it here; although at

the ſame time every one will confeſs that all the other Senſes have a ſhare in this Phænomenon, when they repreſent all the Perceptions that are excited in their proper organs, when at liberty to be acted upon. This may be true, not only of Perceptions, but even of Senſations alſo. Theſe are often felt in the moſt lively manner when aſleep, ſometimes indeed occaſioned by the real cauſes of Pain acting in the body, but moſt commonly from a vague Memory of ſuch accidents as might have happened to us, occaſionally before. When indeed all our Perceptions, are brought forth to action, it is no wonder that our Imaginations ſhould riſe to ſo high a degree as to exhibit to us different Senſations, even when no cauſe of them ſhould exiſt in the Body; and it may be proper perhaps to advance here, that ſome of the Perceptions even may ariſe from the ſame ſource, when aſſiſted by every other. This may be done, I think too without derogating from our former opinion; for we do

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not deſire by that to deſtroy the force of Imagination, even when we are aſleep, to obſcure any exerciſe of the Mind at that time, or to imagine, that it ever requires that ſtate of inactivity which is neceſſary for the body. The whole of what we deſire to eſtabliſh is this, that as when awake the firſt Actions of our Minds are derived from our Perceptions; ſo when we are aſleep, the firſt origin of Dreaming is to be derived from this ſeeming repreſentation of theſe Perceptions, by a Stimulus operating upon the organ.

FROM what we have advanced, we may be prepared to explain ſome of thoſe circumſtances which occur in Dreaming, and determine its nature.

1. IN the firſt place then, we may obſerve, that when the Mind does not dream, it exerciſes that contemplation abſtracted from Senſe, which we experience in a Reverie. We do not, however, remember

Thoughts from this ſource, no more than whilſt awake, we remember the effect of that cloſe Meditation. We ſometimes have a notion that we were contemplating a ſubject of an extraordinary kind; but of what it is we are entirely ignorant. Memory is ſo dependent upon ſenſible circumſtances, that where theſe are wanting, there are but few that can exerciſe it with any great vigour, and hence it is no wonder we ſhould often loſe thoſe thoughts that are unattended by ſomething of this nature. May not this be the caſe with thoſe perſons, who ſleep and imagine they never dream? They forget the ſubjects upon which they were employed, and very often that they enjoyed any of their thinking powers. I would gladly pay this compliment to Mr. LOCKE, who imagined that the Soul ſlept during the Reſt of the Body. This opinion, was founded upon his own obſervation: He found in himſelf an inability to remember his ſleeping Thoughts, and even that he enjoyed any at all. This led him to that con-

concluſion. Every one will acknowledge that he muſt have been a very cloſe Thinker, and his thoughts were ſuch as I have excepted to as conſtituting Dreams. No wonder then that by this conſtant Action of the Mind he ſhould exclude all the impreſſions of ſenſible objects, and diſqualify himſelf from this power.

THAT our ſentiments upon this head may not ſeem entirely improbable, let us reflect a little upon ſome of thoſe circumſtances, that may happen to us whilſt we are awake, and engaged in a Reverie. Perſons of very intenſe Thought, and what is called Abſence of Mind, being ſuddenly rouſed from a ſtate of Meditation, which they have been obſerved to enjoy; upon this accident, have not only forgot the ſubjects of their contemplation, but even that they were thinking at all, and the only ſenſible object they poſſibly could be concerned in, which was Time, has been abſolutely forgotten by them. When we ſee,

therefore, that our Thoughts are ſo powerful as to overcome our original natural Perceptions, in a ſtate, when the organ is moſt perfect, and objects are perpetually impoſing themſelves upon us; it is no wonder that to ſuch Minds the mere repreſentation of this affection, ſhould be loſt in oblivion. Beſides this, we may obſerve, that as the ſudden acceſs of any object even when awake, deſtroys the effect of ſuch meditation; it is not ſurprizing that the ſudden impulſe of waking from ſleep, ſhould deſtroy thoſe thoughts, which if remembered, would conſtitute a Dream. Theſe ſentiments are ſo far from determining the Soul to ſleep as well as the Body, that we may ſee from them that it is the moſt active and vigorous at that time, and notwithſtanding no new Thoughts are ſuggeſted to us, we may derive this utility from them, viz. the preſcribing the mode in which we ought to think, and enjoying the higheſt exerciſe of mental Powers. They may likewiſe ſuggeſt to us this reflection,

flection, that this ſcheme is ſo far from deſtroying the notion of immortal Life, that it eſtabliſhes its truth, upon a rational and intelligent footing, entirely independent of any immediate ſenſible object, and conſiſtent only with intellectual powers.

2. FROM what we have advanced with regard to Dreaming, we may deduce in the ſecond place the confuſed and diſturbed nature of our ſleeping Thoughts. Engaged only in the mere objects of Senſe, without any determined patterns, they are influenced by a vague uncertain Memory. In conſequence of this we become acquainted with ſtrange and unaccountable Figures, and are intereſted in the moſt fleeting and tranſitory ſcenes of life; and as in the Organs of Senſe, Perceptions are obſerved, which when they are capable of exerciſe, no longer produce any effect, ſo in different parts of the body Irritations are obſerved, which when we are awake, loſe the impreſſion of the object by which we

are variouſly affected. This ſhifting from one part to another, or in different circumſtances, occaſions that hurry and diſturbance, that is to be obſerved in our Dreams, and thus it happens, that we ſeldom in thoſe caſes, form any perfect Idea in our Minds.

WE have upon the whole then, formed a conjecture that Dreaming depends upon a power in the circulating fluids, of ſtimulating our organs of Perception when aſleep and unfit for uſe. But they may produce an effect of this kind, even when we are awake, and the organ is in perfection. When the Stimulus of the vital fluids, is become very violent and exceſſive, it overrules the force of the natural object of Perception, although it is not yet powerful enough to cauſe a direct Senſation. In conſequence of this, different objects will be preſented to us, than what are impreſſed from thoſe that are external, and a depraved and confuſed Memory will ſuggeſt ſome accidental

cidental circumſtance to our Minds. This repreſentation of different objects, from what are really perceived is called a Delirium. A ſymptom of the moſt violent diſorder, and which never occurs, but where there is a very high degree of Stimulus active in the body. The cauſes of this may be, either too great a ſpiſſitude and denſity which obſtructs the Motion of the vital Powers, and in conſequence excites a violent degree of Action in them; or a predominant Acrimony which immediately affects and torments them. We are never diſpoſed to diſcover, by our common power of Senſation, any increaſed Action of our vital Powers, but our organs of Perception are capable of doing this, and we employ them conſtantly for that purpoſe. Our Touch is the ſtandard we make uſe of to aſcertain this fact. It is not improbable, however, that in all our organs the ſame may be perceived, and if this ever takes place, it muſt appear in the reſemblance of its proper object, as we have

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ſhewn in our thoughts upon Dreaming. We cannot feel with our Eyes any more than we can ſee with our Fingers, and from hence we may argue, that the Perception of a Pulſe, in the organ of Sight, muſt put on a very different appearance from what it does to the Feel. If we had never ſeen, we ſhould never have had any Perception in that organ, but we ſhould have been capable only of the general affections of Senſe. But after we have once enjoyed that faculty; Memory naturally ſuggeſts the idea of the proper object, whenever an impreſſion is made, notwithſtanding it proceeds from an external cauſe, and nothing *ab extra* correſponds to it.

THE ſame will happen likewiſe, if the impreſſion from within is ſuperior to that made by any external object, that ſhould offer itſelf. This may be proved from the influence of one object over another; for it may always be obſerved that the ſuperior im-

impreſſions are attended to and regarded, whilſt the inferior are neglected or obſcured; and upon this the nature of Light and Shade is eſtabliſhed. Now in caſes of Delirium, a very ſtrong impreſſion is made upon the Retina, from diſordered Matter circulating through its ſmall veſſels; but the objects from without are few in number, or inconſiderable in degree; hence it is that theſe are unattended to, whilſt thoſe which appear more vivid and conſiderable are obſerved. Diſtance, as we have remarked before, is eſtabliſhed upon a principle more mental, than any bodily affection; upon this account therefore, perſons in this ſtate are very competent judges of this effect, and always imagine objects to be much nearer to them than they really are, as well as increaſed in their ſize and bulk. Delirium in the ſame manner as Dreaming has a reference to every organ of Perception, but it chiefly exerciſes itſelf upon the objects of Sight. For this reaſon therefore, we were willing to give it

a particular conſideration in this place, eſpecially as it will be very eaſy to deduce every other effect from it, agreeable to the rules we have already laid down for this end.

SECT. V.

Of Hearing.

IT would be a difficulty perhaps to determine, whether the organ or inſtrument of Senſation, which we have laſt deſcribed, or that which we are now going to elucidate, was more uſeful to mankind, or conveyed to us the higheſt degree of intellectual pleaſure. A preference certainly there is, which muſt be given, and from the extent of the organ of Sight, and the accuracy with which it brings information, is certainly due to that inſtrument. But ſtill in the perceptions of the Ear, we ſhall find

find more of that truly mental and refined pleaſure which can flow only from a peculiar caſt and diſpoſition of Mind; and are informed by it more of the nature of thoſe diſtinctions that reſult from the exerciſe of mental powers. Beauty is an object of our ſeeing faculties, and is the moſt intellectual which that Senſe perceives; but ſtill it carries a conviction with it of ſomething ſenſual, and convenient for many purpoſes of our material form: upon this account, we can hardly review the idea of its excellence, diveſted of its object or alienated from Matter. But Harmony, which is the object of this organ, is ſo pure, ſo free from any incumbrances of this nature, and ſo independent of any ſenſible object, that although always excited by it, yet the idea is centered in itſelf; and we admire the force of its power, whilſt the hand that gave it birth, or the inſtrument upon which it is raiſed, is neglected and diſregarded. Upon theſe accounts, we have delayed the conſideration of this organ, until the laſt.

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We ſhall not, however, be able to enter into a very exact diſquiſition of it, and for this reaſon, that the objects that affect it are ſo ſimple and uniform, and ſo different from the peculiar forms of Matter.

THE inſtrument, by which Hearing is perceived in the Mind, is ſituated at a very little diſtance from thoſe of the other Senſes. But it is as different in its mechaniſm as the objects that affect it. The Ear is formed like a muſical inſtrument, and if it could be imitated by art, might be found perhaps the moſt perfect pattern of ſuch a body. It is not probable however, that it ſuggeſted ſuch an idea to the firſt artiſts. Anatomy had then made but little progreſs, and the diſcoveries of this wonderful machine have been accompliſhed in very modern times. A compoſition of various cavities to return and reverberate ſound, after it is once raiſed, and of ſtrings to excite it at firſt, may give a ſufficient idea of this organ, to account for the various revolutions

tions performed on it, without entering into a minute examination of its particular ſubſtance, &c. Upon this ſtructure, we ſhall ſee that Motion is entirely requiſite to produce the effect propoſed. In Taſte, in Smell, in Touch, and in Sight, the neceſſity of Motion was not ſo apparent at firſt ſight. But in this ſenſe we ſhall ſee, that without it no agitation can be raiſed, and in conſequence no Perception produced. The immediate object that occaſions the vibrations of the auditory Chords, is one ſimple uniform body, acting by a particular power with which it is endued. This ſubſtance is, that pure element the Air, and the power by which it acts is Elaſticity, or a general Repulſion by which its parts recede from each other. This body equally extended over the earth, and ſurrounding every thing upon it, muſt be ſuſceptible of continual changes as they are put into motion, and thus become in almoſt a perpetual ſtate of action, and when carried forward to the organ of Hearing,

ing, excite that affection. Notwithſtanding, however, that the Air is the immediate cauſe of this effect; yet it muſt be conſidered only as the inſtrument, and there are ſeveral other circumſtances that muſt be taken into the account, in order to create Sounds.

1. IN the firſt place, there are peculiar bodies that excite them much ſooner than others; and theſe muſt be determined by a particular form of combination, or rather method of conjunction by which their parts adhere to each other. There ſeems to be ſomething very extraordinary in this fact, and it is difficult to account, why ſome bodies ſhould become more ſonorous than others, and why ſome ſhould be entirely ſilent. The beſt explanation that can be given, is from a capacity of repeating vibrations after once they are excited in ſome, while others are dull, ſluggiſh, and inactive. But what is neceſſary to enter into the compoſition of theſe bodies

to occaſion this power, we cannot ſpeak with any degree of certainty. For notwithſtanding we find this quality peculiarly excellent in one ſpecies of bodies, viz. Metals, yet what the ultimate compoſition of theſe are, we have never preſumed to determine.

2. IN the ſecond place, another circumſtance which we may obſerve neceſſary to excite Sound, is the confinement of Air to a narrow and circumſcribed ſpace. This is the origin of thoſe natural Sounds which are the moſt beneficial to mankind, and from which language derives its origin. How this is accompliſhed would belong to another place to conſider. Hearing is to be eſteemed as a paſſive power only, when conſidered in an intellectual view, it is active as it conveys ideas to the Mind, after once Sounds are excited. We have already hinted at the wonderful mechaniſm by which Action is excited in this organ, and we have only now to add, that it may

be taken as a ſpecimen for the reſt of the Senſes to demonſtrate the power of Motion in their ſeveral organs. In this we ſee the Motion of the Air is firſt raiſed to give the impreſſion, the impreſſion itſelf is induced as upon a muſical inſtrument, and the Re-action of the auditory Fibres, by which the notion is conveyed to the Mind, is a further confirmation of the fact. From hence we may conclude then, that there is nothing truly paſſive in the whole of this operation, but that a conſtant exerciſe of a moving faculty is neceſſary for this end.

WE have already hinted likewiſe, at the great ſource of intellectual Pleaſure and Pain, which this ſenſe affords by the influence of Harmony and Diſcord. Beſides this, it is capable of an effect of this kind from language, the moſt divine of all human inventions, of the greateſt utility to mankind, as well as the moſt unaccountable in its origin. Upon both theſe different perceptions, derivable from this organ, it might

might be neceſſary to deſcant; and a ſufficient field is open for a diſquiſition of this nature, we might enquire into the origin of natural Sounds, and might account for the various effects of muſic. But this would not only be enlarging our plan too far, but would lead us into a conſideration of powers too intellectual for our preſent purpoſe, and from which no corporeal action can be adduced. We cannot ſpeak poſitively of the ſenſible Pleaſure or Pain that reſults from this organ; in general theſe affections are purely intellectual, but like the Eye it may become diſordered in ſuch a manner, as that every Sound ſhall be diſagreeable and uneaſy to us. And as in that organ Delirium was induced from an action ſimilar to the original impreſſion, ſo in this we may deduce the ſame effect from that cauſe, and by this means account for the Tinnitus Aurium, a ſymptom of the utmoſt conſequence in Fevers.

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CHAP. VI.

Of IMAGINATION, and its Power in creating MOTIONS in the Corporeal Syſtem.

SECT. I.

Of a ſpontaneous Power in the Mind to influence a corporeal Effect independent of the Will.

EVERY one muſt allow, that there is a very ſtrong connexion between the Body and Mind of Animals, and that all our ſpontaneous actions, and many even of thoſe which occur without our conſent or knowledge, are not directed by mechanical rules, but depend upon a much more noble prin-

principle. It is perhaps capable of demonſtration that all our actions, either ſpontaneous or otherwiſe, ariſe from the ſame ſource, either as a primary or a ſecondary cauſe.

THE immediate influence of the Mind, is moſt evident in the Actions of the Will, where every one is ſufficiently conſcious of it in his own breaſt. But yet there are other Actions produced, entirely independent of the Will, and yet rely upon a mental cauſe. We do not, however, immediately perceive the Action, and are only made acquainted with its effects; upon this account, therefore, we do not ſo eaſily admit of this concluſion, but ſeek for the interpoſition of ſome other cauſe. The modeſt Bluſhes of innocence, the Tears of a perſon afflicted with diſtreſs, or the involuntary Laughter of one that is pleaſed, are certainly Affections of the Mind, and yet independent of any voluntary power. The manner indeed how theſe effects are

produced, hath not been ſufficiently enquired into. If it had, many other affections of our conſtitution, and many diſorders likewiſe, might have been found to ariſe from the ſame ſource, which have hitherto been vaguely accounted for, or left in ſuſpenſe. Becauſe it is difficult, is no reaſon, why we ſhould relinquiſh a ſearch after truth. For from what has already been diſcovered in Phyſics and in Medicine, we may imagine, that every thing almoſt is capable of being brought to light by the inventions of mankind. We are ſenſible of many objections that may be alledged againſt this power of Action in the Mind, and eſpecially if we attempt to deduce the cauſe of any diſorders from it,

1. IN the firſt place, it may be ſaid that ſome other cauſe muſt interfere for this purpoſe, of which we are ignorant. But no other cauſe can be ſuggeſted in this place, but of the following kind, either ſome pre-diſpoſition of the Body, which acts

acts as a Stimulus, or the influence of ſome material Subſtance, which conſtitutes ſuch a Body. That theſe have indeed a very powerful influence, in exciting the action of the animal Fibre, I am ſo far from denying, that I have before endeavoured to prove it in its utmoſt extent; but I think it is equally evident, that they do not always act whenever the Mind ſeems to cauſe a Motion in the ſyſtem. Every one will grant, I believe, that there is no neceſſity for a peculiar diſpoſition of the Body, or the action of any particular Stimulus, to excite Tears in a perſon in grief; no more do any other actions, that ſeem to ariſe from the Mind, always require a Stimulus to induce them; but the Mind may perhaps be as powerful when theſe things are abſent. A Stimulus applied to the Eyes will cauſe the Tears to flow, and a Stimulus applied to any other part of the Body will cauſe an Irritation in it. But in general, the Mind cauſes that Irritation in the Eyes without this aſſiſtance; why may it

not act equally as powerful in any other part of the Body?

2. ANOTHER objection that may be alledged againſt this doctrine, we ſhall ſuppoſe to be this, that the cauſes of theſe Actions, which we deduce from a mental influence, may be unknown to us, or be beyond our ſearch, and hence may be determined to belong to any Actions or any Diſorders, to which we ſhall chuſe to affix them. Many of theſe no doubt are of ſuch a nature, that we can refer them to no immediate cauſe at all, having no lights by which we can trace their origin, no apparent cauſes preſent at their exiſtence, and no concomitant ſymptoms, which acknowledge cauſes that are ſettled and determined. The cauſe, however, of which we are treating, can never be ſaid to be a ſubterfuge for theſe that are unknown. For notwithſtanding it may be ſaid, that the Mind is a Subſtance, that we cannot examine into, and may produce many effects

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which we are not able to demonſtrate as ſuch, yet when we have this evidence, that the Mind can produce ſuch Actions, as I hope will hereafter be demonſtrated, and that it is always apparently preſent as a cauſe when they are produced; we need be under no anxiety, when it is ſaid that other Actions and Diſorders may derive their origin from this ſource, when this cauſe cannot be imagined to be preſent. A continual preſence, I allow, is not an undeniable argument, in favour of a cauſe whenever effects are produced. Effects from the ſame cauſe, which appear at the ſame time, may oftentimes be taken for cauſe and effect, as for inſtance, the production of Light and Heat, which notwithſtanding they ſometimes appear as Cauſe and Effect, at other times ſeem to acknowledge the ſame origin. But I believe the ſame cannot be imagined in the preſent caſe: for in that the influence of the Rays proceeding from the Sun in a greater or leſs denſity, or ſome operation in nature may be

be the cauſe of each of thoſe conſequences, but what one ſubſtance, or what operation can be the author of thoſe which we are mentioning here. A perſon is injured by another, he is fired with reſentment, but the other eludes his purſuit. This preys upon his Spirits, and in conſequence introduces Diſorder into his conſtitution. What one Cauſe can produce both theſe Effects immediately; the injury he receives from which the whole originally proceeds, can never occaſion the Diſorder, but as it firſt affects his Mind, which then acts by its own immediate influence. By this then we may ſee, that ſuch can only be produced by a mental power, which in this caſe acts as a Cauſe, and is not a ſynchronous Effect.

3. A FURTHER objection that may be adduced againſt us, is entirely a medical one, and relates to the Effect of the Mind in creating Diſorders. It is this, that by admitting this power, we may confound the

the diſtinctions of nervous diſeaſes, a claſs of ſuch infinite conſequence in the theory of Medicine. It will be a very great difficulty indeed to anſwer this queſtion, the term Nervous being ſo vague and uncertain, and the Cauſes from which theſe Diſeaſes proceed ſo various: for they may derive their origin accidentally perhaps, either from the Cauſes we are now ſpeaking of, from a Stimulus that irritates the nervous Fibrillæ, or from ſome unknown cauſe, for which we can aſſign no reaſon of its Action. It would be an advantage perhaps to phyſical knowledge, if this term were expelled from it: for every diſorder almoſt, agreeably to modern theories, may be deemed of this nature, all having ſome connection, or being abſolutely dependent on the nervous Syſtem. If the defect lies in the obſcurity of the term then, we need be under no concern about it. But waving this, if we confine nervous Diſorders to thoſe where we evidently ſee the Mind affected, as well as the Body, and where

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there is evidently a depreſſion of the Spirits; let us ſee what confuſion, the Diſorders we are deſirous of aſcertaining, can introduce amongſt them. It is evident theſe, as well as the others, depend upon a mental influence, but the greateſt part of nervous Diſorders depend upon it as a ſecondary, not as a primary cauſe.

LET us ſuppoſe that the Mind, as endued with Action, is continually endeavouring to exert itſelf, and to perform ſome Motion; and the Body, let us imagine to be its inſtrument for this purpoſe: Whilſt the Body then is in a perfect ſtate, the Mind may act upon it as it chuſes, and direct it to whatever Motions it thinks proper and convenient: It may direct it ſometimes to thoſe that are prejudicial and deſtructive, as well as to thoſe that are ſalutary and uſeful. When it produces the former, there is no doubt but it will cauſe a Diſorder, and then we may pronounce it the primary and ſelf-ſufficient cauſe of the Diſeaſe.

Diſeaſe. But we may ſuppoſe likewiſe, the Body to be indiſpoſed, to be ſluggiſh and inert, and incapable of being acted upon by the Mind: in conſequence of this, it finds a reſiſtance in the Body to its Action, and hence becomes uneaſy, and diſturbed in its Motions, Upon this, there occurs a Diſorder both in the Mind and the Body, as in the former caſe; but the Mind is not the primary cauſe of it: But as in the other caſe, it was acknowledged to be ſuch, with regard to the Body, ſo here the Body becomes the primary cauſe of the Diſorder with reſpect to the Mind. In that, the Mind being previouſly diſordered, affected the Body with it, but in this the Body being indiſpoſed, brought upon the Mind a ſimilar effect. From this then, we may ſee that a very important diſtinction ariſes between nervous Diſorders, and that thoſe, which are to be deduced from the ſubject of this chapter, conſtitute only one part, which may eaſily be diſtinguiſhed from the other.

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HAVING removed ſome of the objections that may be alledged againſt a power of the Mind in general, of acting upon the Body, and producing Diſorders in it, we ought now to proceed to examine that particular faculty which is endued with this power, and explain the manner by which theſe effects are produced. We have already obſerved, that there is a particular power of the Mind, which no one doubts of effecting various Actions; where we can trace the immediate connection, and where we can perceive the influence of the Cauſe to be inſtantaneous with the Effect. This is called the power of the Will, in whoſe Actions the preſence of the Mind can never be doubted or diſputed. It will be neceſſary, however, before we enter more particularly into this ſubject, to examine into the extent of this power of the Will, as well as the manner in which it produces its Actions, in order to diſcover whether the Actions, for which we are

now

now contending, may not proceed from its influence.

BOTH theſe things have been much controverted amongſt Phyſiologiſts: It is very ſurprizing how mankind could ever enter into a diſpute concerning its limits: Every man knows when he wills an Action to be done, and is equally conſcious of it when it is produced. Whoever attempts to extend this Power beyond this, certainly extends it beyond all bounds, and reduces it to nothing: For he makes a man to will an Action, and not to will it at the ſame time, which is impoſſible. If we take away Conſciouſneſs from Willing, we entirely take away the power of Willing at all; but if we leave Conſciouſneſs, there can be no doubt concerning the extent of its Action. The reaſons of the error and obſcurity, by which Men have been deceived upon this account, may probably ariſe from a preconceived opinion, that the Will involved every other power of the Mind, or at leaſt,

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from being accuſtomed to conſider no other mental faculty but this. We are abſolutely certain, indeed, of no other power, which can be ſo eaſily demonſtrated; but yet we have very good grounds to conjecture, that there are other powers, notwithſtanding we may be ignorant of their proper and peculiar nature.

THE manner in which the Will acts upon the Body, is more uncertain and difficult. All that we know is, that upon every Volition, a particular Action, viſible to the Eye, although of a peculiar kind is excited. But ſuch Actions are not confined to a voluntary influence, for they may be produced without it, as is evident when ever we are affected by violent Stimuli, in epileptic fits, or other diſorders that ariſe from ſomething very acrimonious and pungent. Does this admit of a conjecture, that the Will acts like a Stimulus! We muſt leave it in doubt, in order to take notice, that the Will acts only upon a particular

ticular part of our Conſtitution, of a peculiar form and conſtruction. This is the *muſcular* Part to which its Action is confined, but over all of this kind it has not an indiſcriminate power. The Heart may be conſidered as a Muſcle. The Arteries and many Viſcera have muſcular Coats, and there are ſeveral regularly formed Muſcles of the Body, over which the Will has either never acquired a power, or has loſt it for want of frequent uſe. We ſee then that the Actions of the Will extend no farther than where we are conſcious of them, and that they are confined to Muſcles.

WE have not as yet particularized the Actions which are the ſubjects of this Chapter, any otherwiſe than as dependent upon the Mind. We may, therefore, in forming the diſtinction between theſe and the Actions of the Will, proceed upon the general plan, and enquire whether it is not poſſible that other Actions may be pro-

duced by the Mind independent of that power. If Conſciouſneſs of Willing may be preſumed to be the criterion of its influence, this queſtion may eaſily be decided. There are ſo many Actions performed in our ſyſtem, not only without Conſciouſneſs, but which we are conſcious are diſagreeable to us, and which we endeavour to prevent by our voluntary powers. But here an objection may be raiſed, that our Wills even are neceſſitated in their Action, by the apprehenſions of moral good and evil. To determine this queſtion, it would be neceſſary to diſcuſs the metaphyſical debate of *Liberty* and *Neceſſity*. This we ſhall avoid at preſent, and only aſk this queſtion, which I think may clear up this point. Whether in the Paroxyſms of an *intermittent Fever*, our Wills concur with the agitation of Body, that is occaſioned in it, or whether we are not conſcious of willing, of deſiring, and of endeavouring, by every thing that lies in the power of the Will to remove it.

WE have ſeen that though the voluntary power is confined to Muſcles, yet that theſe may be moved without its concurrence, in many of the principal Actions of the Body. But ſuppoſe a Muſcle could not be moved without it; are there no Actions in the Body but what are performed by theſe parts? A Muſcle may be conſidered as a fleſhy ſubſtance of a red colour, and compoſed of fibres that in action are always contracted in their lengths. But how many parts of the body are there, that have no ſuch ſtructure, and whoſe Action does not in the leaſt reſemble this, but is performed in a very different manner? Of this, we have a very lively inſtance in the *Cuticle*, and indeed in all the Membranes that inveſt ſo many parts of the body. The actions, however, of theſe parts and moſt of the reſt, which we have adduced as examples in this Section, are indeed excited by a Stimulus; but we ſhall hereafter

ſhew that the Mind has likewiſe a very conſiderable influence over moſt of them.

I NEED not mention here how abſurd it would be to ſuppoſe, that the Will would ever chuſe to produce a Diſorder in the body, if it lay ever ſo much in its power. And this may be imagined, not from a fondneſs of life and eaſe alone, but from this circumſtance alſo, that it would have an unlimitted power over all the neceſſary functions, which it might put a ſtop to at once, and finiſh life without the tedious proceſs and bitter languiſhings of Diſeaſe. But we find from experience, that the Functions are not under the power of the Will, and that whenever mankind enter upon a reſolution of deſtroying themſelves, by the means nature has put into their hands, they never think of tormenting themſelves by any previous Diſorder.

SECT.

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SECT. II.

Of the Power of Imagination conſidered more particularly; the Cauſes of its Action, and its Effects on the Body.

WE are now to enquire in a more particular manner into another faculty of the Mind, than that which ſo eaſily ſuggeſts itſelf: And the firſt thing that we are to conſider upon this occaſion is, whether it is the whole power of the Mind, beſides that of the Will; or whether it is like that, ſui generis, and confined to peculiar motions. The Mind no doubt may be poſſeſſed of various uncertain powers, by which it acts upon the corporeal ſyſtem. We are ſenſible of a few only, that of the Will is moſt evident. This perhaps may admit of a demonſtration equally as faithful, and if we can deduce every effect from it, we need not

be anxious about any other of which we may be ignorant.

THIS power is what we ſhall call that of the *Imagination*, a term indeed in itſelf vague, uncertain, and groundleſs; but which yet has had a peculiar ſignification appropriated to it by the generality of mankind. The moſt ſtrict, original, and confined idea of it is to be derived from mere Perception, or the repreſentation of Images in the Mind. It was eaſy to transfer it from this to a ſimilar repreſentation of objects when they were abſent, and thus was made to correſpond to the power of Reflection. But as ſome kind of Images are neceſſary to the exertion of every mental faculty, the Ideas, that derive their origin more immediately perhaps from ourſelves, are primarily formed in our own Minds, and have no exact patterns in nature, were ſtill called Images, and the faculty of exciting them ſtiled Imagination. By this means, we ſee it is become ſimilar to Invention alſo. It is ſurprizing

prizing how much it ſhould be appropriated to the laſt of theſe faculties. The effects of it are peculiarly called the fruits of Imagination; and what do we underſtand by Fancy, but a high exerciſe of this power. Thus in its moſt dignified ſenſe, a man of fine genius is ſaid to have a fruitful Imagination, and even in its loweſt acceptation, the whimſical and fantaſtical Humoriſt, who invents trifling objects of enjoyment, is ſaid to be Imaginary; and the Diſeaſe, in which Symptoms are invented, that were never felt, has been always ſtiled the Diſorder of this power.

As we are to ſpeak of Imagination, not merely as a power of the Mind, but as extending to the Body, and as a power that acts upon it; we muſt include every ſignification that we have allotted to it, as it depends ſometimes on one ſource or ſometimes on another. In all theſe it produces effects, which although they do not admit of an exact reſemblance, yet in

themſelves have a very near affinity. With reſpect to this power, as a quality of the Mind, it muſt be looked upon as active in one reſpect only; but here we are to take quite a different view of it, and conſider it as active upon the Body in every reſpect. Imagination then, we may obſerve, in this ſenſe is extended from its former ſignification, to an effect that is produced from its former principles, and thus ſignifies a capacity of exciting Actions upon the corporeal frame, ariſing originally from the different powers of Senſation, Reflection, and Invention. But ſtill, whenever thus qualified, it is not ſufficiently active of itſelf, but diſpoſed only to this end, and requires ſome particular motive or cauſe to promote that ability. Let us next conſider then what it is that gives it this power,

IN the firſt beginnings of life, Ideas enter into our Minds, are there treaſured up with care, and are occaſionally brought

brought out to uſe, by Recollection and Memory; but never give us any uneaſineſs when we are without the objects of them, or pleaſure when they are preſent. We are ſatisfied almoſt at that time with inſtinct, which directs us to our food, and we are otherwiſe taken care of by our Parents. But when Parents begin to loſe their Affection for us, and inſtinct leaves us to ourſelves; what have we truſt to for our ſupport and preſervation? Nature has at this time laid in ſufficient ſtore to ſupply our future wants, by means of thoſe Ideas that are treaſured up in our Minds. We begin to perceive that many of the objects of them are neceſſary and convenient for our future ſubſiſtence; upon this, there ariſes a particular deſire for their enjoyment, and this is the Origin of Paſſion. As a proof of this, we may obſerve, that through all the occurrences of life, every object affects us with this circumſtance, when it becomes convenient for us; then, and not till then, we begin to deſire and wiſh for it; and

from hence it is, that we ſee different Paſſions annexed and ſuited to the different ages, as well as ſtations and conditions of mankind. There are but few ideas that can poſſibly ariſe from any object, to which we are abſolutely indifferent, ſome good or evil muſt be ſeen or apprehended in moſt of them; hence the deſire for them, or averſion to them, is continually agitating of us, and our whole exiſtence is a life of *paſſion*. Paſſion in conſequence of this, always directs to Actions, or is the motive by which theſe are performed. It may be aſked, however, whether ſuch an affection of the Mind always cauſes an Action of the Body? It ſeems moſt probable that it does; but to examine this more exactly, we ſhould always have in view the diſtinction we have before inſiſted upon, between the Actions of the Will, and what we are now examining; for that requires ſomething more than Paſſion to excite it. It is ſomething that ſuperintends our Paſſions, over-rules our Deſires, and directs to what

is right, that governs the Will, and that is *Reaſon*. In this caſe, the Will acts under the conduct of this Power, in deſtroying or promoting the Action of Paſſion as it ſees fit. It does not act, however, in placing before us or in removing the object, but by ſuppreſſing or encouraging the Action after once it is excited. The Action of Paſſion ariſes immediately from the object, and precedes that of the Will. If there was no object of Deſire, this affection would never act; and if that did not act, the Will would lie dormant. The true ſtate of the caſe between theſe two Actions, may be thus further illuſtrated. Whenever objects offer themſelves with which the Ideas of *good* and *evil* are connected, they are received into the Mind, they create Deſire, and very often a viſible Action of the Body; if Reaſon approves of this Paſſion, it encourages the Action to accompliſh its end, and adds an effort of its own, by which it completes an enjoyment. But if it diſapproves of it, it endea-

endeavours to ſuſpend it, and interpoſes its own influence to ſtop and prevent the gratification. Hence it is, we ſee, that the Action of the Will is neceſſary for Fruition, but not for mere Motion, and that Action evidently may ariſe from *paſſion*, though not perceptible to our Senſes.

FROM the whole then, that we have examined, we may form this concluſion, That with regard to the power of *Imagination*, the three faculties of Senſation, Reflection and Invention, are the Principles upon which it proceeds, and that *Paſſion* is the motive to action ariſing from them.

IT is true indeed, that we do not always ſee or perceive an Action of the Body, whenever the Mind is affected with Paſſion; but we have juſt reaſon to ſuppoſe it almoſt always the caſe, from its viſible effects when violent or of long duration, from the changes induced by it in the ſyſtem, and what is to our preſent purpoſes from

from the great influence of it in many functions and diſeaſes of the human Body. We may reaſon too upon the juſtneſs and propriety of ſuch Actions *a priori.* The Actions of Paſſion may be conſidered as the ſame guides to the Actions of the Will, as the Paſſions themſelves are guides in a moral view to the exertions of the Will.

WE ſhall now endeavour to evolve theſe Actions more particularly, and obſerve the different effects, which the various kinds of Paſſion produce in the Body. And previous to the great and important changes induced by them, let us take a view of the more ſimple Actions viſible to us, that proceed from their influence.

SIMPLE Ideas can have but very little effect in this way, becauſe it is the affections or particular circumſtances of Bodies that ſtrike us rather than the objects themſelves to which they belong. The firſt

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Action, as well as the moſt ſimple, that ariſes, muſt be from a ſingle object with which the notion of *good* or *evil* is in ſome degree connected. Thus the view of any object, that has contributed at any time to our eaſe and pleaſure, creates in us, beſides the gratification of an intellectual Feeling, an agreeable corporeal Senſation, proceeding from an irritation of the Body. This is the moſt evident upon the view of grateful Food, which not only produces theſe effects, but raiſes a Perception ſimilar to what we felt before, and throws out a copious flow of the ſalivary juice. But Senſation is much ſtronger when objects of Diſpleaſure are preſented to us. To a perſon, who has ſuffered an amputation, or is of a timorous diſpoſition, the ſight of a Surgeon's inſtrument, or of a ſword, has been attended with the greateſt uneaſineſs, has induced often nauſea and vomiting, and occaſioned the relaxation of ſome muſcles. The ſame effects are often produced from nauſeous medicines. I have known a looſe-

a looſeneſs of the belly proceed from the thought as well as appearance of a cathartic, and a vomiting more particularly from the bare mention of an emetic. May not the various Likings and Antipathies, to which almoſt every one is in ſome meaſure ſubject, and which are ſcarce to be accounted for upon any other foundation, depend upon this principle? Every kind of Stimulus, that can affect the Body, may no doubt upon recollection, produce an effect ſimilar to what we have mentioned. In fact, we ſee they do. We have hardly any notion of external Stimuli, but from pungent inſtruments, or from medicines, becauſe they never conſtitute a part of what is neceſſary for our exiſtence, but always tend to deſtroy. But if by any means, we experience medicines of this kind, or by accident meet with any thing very acrimonious; whenever we reflect upon it, we always feel a diſagreeable Senſation in the part affected, ſimilar to what occurred when its influence really exiſted. There

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is no Senſation ſcarcely ſo diſagreeable, as what we feel upon the application of ſtrong acids to the Teeth, and the Idea is equally affecting to thoſe who have ever experienced it, in any degree, or are poſſeſſed of a very ſenſible conſtitution.

BUT it is the effect of internal Stimuli, that we are ſenſible of the moſt frequently, viz. in all the diſorders that are attended with Pain in the human Body. The Reflection upon any of theſe always affects us with an uneaſy Senſation, and a kind of return of the ſame diſeaſe. Whoever has by an unhappy experience, been tortured by any violent complaint of the bowels, a *calculus* in the bladder, tooth-ach, or an amputation in any of his limbs, will confeſs the truth of this obſervation. We muſt acknowledge indeed, that it would be very abſurd to think that any diſeaſe ſhould return with any violence from ſo ſlender a cauſe, where a more particular one does not prevail. But this is evident, that if

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by abſtracting the thought, a violent pain ſhould ſeem to be removed, upon recollection it returns with as much force, if not more conſiderable than before. The influence of Imagination in this reſpect, is exceeding violent in ſome people. I know a perſon of the profeſſion of Medicine, who, whenever he reads a medical deſcription of any painful diſorder, is always affected with a Senſation of the ſame Nature.

NEXT to the ideas of ſingle Objects themſelves, and at reſt as connected with Deſire, we are to conſider the effects they produce, when brought into Action. The Motions of Bodies ſeem to affect us more violently and more extenſively than any other circumſtance that belongs to them. And this may be accounted for in a very rational manner. When we reflect upon a ſingle Object at reſt, the idea ſeems confined to it in that ſituation from which it never varies, and conveys only one idea,

but when the Object is brought into Action, it appears moving and fluctuating from one point to another, and raiſes the idea of diſtinct place, which is almoſt the ſame as of different Bodies. The Ideas are increaſed, although the Body continues to be the ſame. Beſides this, the Pleaſure or Pain likewiſe we receive from any Ideas are raiſed much ſooner by Bodies in motion than by thoſe at reſt, and for the ſame reaſon, becauſe the quick or ſlow tranſition of Bodies occaſions theſe affections, whilſt we are indifferent to thoſe at reſt. Let us examine this by an example: If we look ſtedfaſtly upon a Wheel in a very rapid motion, it affects us with a painful Feeling, becauſe we cannot receive a diſtinct Idea of every point of it, but the wheel itſelf would not perhaps affect us at all. The rapidity of a River, on the contrary, may contribute to give us Pleaſure, becauſe there is no eye, but can eaſily diſcover a ſufficient number of diſtinct points. The river itſelf however would hardly affect us. In

theſe caſes we may obſerve then, that the Motion of theſe Bodies is the ſole cauſe of the Emotion, but that the *pleaſure* or *pain* that ariſes, depends on the degree of it. But to apply this to the power of Imagination. We have preſumed that theſe Actions correſpond to every mental Affection, and from hence the ſame reaſoning will hold good with reſpect to them. But we may almoſt prove it by experiment, that the quick Motion of the wheel, which was mentioned above, very frequently creates a Giddineſs, and this not only when preſent, but afterwards when reflected upon by a lively Imagination. To what other ſource but this, ſhall we refer the diſagreeable Senſations that ariſe in Muſic or jarring Sounds, upon ſome very ſenſible Conſtitutions? Are they not evidently dependent on irregular Motions to which we are unaccuſtomed, and in which we cannot eaſily perceive the relation they have to each other? But on the contrary, the ſmoothneſs of Harmony reconciles their irregu-

larity, and in conſequence excites Pleaſure. It is not only more agreeable or offenſive *Senſation* of the Body that ariſes from *Muſic*; many very apparent effects on the ſyſtem, have been adduced from its influence, and a diſorder, to which it is ſometimes ſubject has been ſaid to derive its riſe from this ſource.

IN the Actions which we have already mentioned, as proceeding from Imagination, good or evil, is hardly perceptible in the cauſes of them. When we reflect upon Actions, with which theſe circumſtances are connected, a little more particularly, we ſhall be affected much more violently, and this will happen either from thoſe that are real, or thoſe that are imaginary only. There is nothing affects our Minds more forcibly than the deſcription of a famous Rencounter. The advantages of one party, and the diſadvantages of the other, alternately ſwell or depreſs our enjoyments. The Body partakes of an Affection correſpondent

ſpondent to theſe circumſtances. Thus the death of any favourite Hero, eſpecially if attended with any horrible circumſtances, raiſes a ſtrong and violent ſhuddering, whilſt on the contrary, the ſucceſs of another, in whoſe hiſtory we are particularly intereſted, gives us that light and eaſy emotion which is peculiarly appropriated to joyful events. We are however much more forcibly affected, when theſe things approach nearer to ourſelves. If any Action has contributed to excite any of our Paſſions, we reflect upon it with a ſimilar emotion. The delivery from any fatal accident, has frequently been attended with the worſt of circumſtances, and theſe often ariſe from reflecting upon the danger we ſuſtained at ſuch an extremity. The appearance of violent Paſſions in another perſon, is what we are very much affected with, and this may not ariſe from any fear of detriment, becauſe we may be in a ſituation of abſolute ſecurity; but from a reflection of the diſagreeable nature of ſuch an Action in

ourſelves. To this head, may be referred likewiſe, the diſagreeable Senſations that horrible perſons, who are deformed in ſome part of their Body, but eſpecially in their Face, excite in us. Tranquillity and eaſe inſpire the Countenance with a ſmooth and calm appearance, whilſt tumultuous Paſſions occaſion the contrary. From hence it happens, that a deformed Countenance is eſteemed the mark of Anger and Ill-nature. This deformity may likewiſe proceed from long continued Pain, which any one ſuffers; but whether it has this effect or not, Pain in another perſon is a ſource of very powerful Senſations in us, reſembling in ſome meaſure what the afflicted perſon has endured. Every one is acquainted with theſe facts; that nothing is more frequent than for vomiting to excite the ſame action in ſome of the ſpectators, and that the obſervation of an amputation has given a Senſation in a part correſpondent to what is affected, in ſpectators who have not often been preſent at ſuch an operation.

THESE Actions, ariſing very evidently from our Ideas, and connected always in ſome meaſure with Deſire; might have been included amongſt thoſe which we ſhall deduce from particular Paſſions: But as they do not ſeem entirely capable of being adjuſted with any particular kind, as they ſeem to be produced by a more ſimple Affection, and as they may ſerve more properly for an introduction to them, we have treated of them ſeparately: But ſtill it muſt be remembered, that they are always connected with ſo much good or evil, as to excite Deſire or Averſion. And this appears in a very different manner from the cauſes whence they derive their origin, and the methods by which they affect us.

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SECT. III.

Of the Actions excited by the different Paſſions.

WE are now to explain the effects that are produced by what are more properly called the *Paſſions* of the Mind, or the different modes by which Deſires exert themſelves in us, and aim at Gratification. Theſe poſſeſs very evidently a power of deſire in our breaſts, that is not ſubject to any peculiar mode, or has this determined by the object alone. This is what may be called a ſimple Deſire, or general Paſſion. What are more ſtrictly denominated Paſſions, although excited towards the ſame object, operate very differently on the Mind. No one will diſpute the different manner with which *Fear* and *Anger* act upon us, although raiſed by the ſame perſon, and upon the ſame

ſame motive. But this general Affection always excites in the Mind the ſame emotion towards the ſame perſon, and differs as the object varies. There are but few viſible effects which we can take notice of, that ariſe immediately from a Paſſion of this kind. But yet ſome of the moſt powerful have been attributed to it, and it has been accounted the ſecret cauſe of ſome very urgent diſeaſes. Every man, who attends to his own Feelings, will find in himſelf, an uneaſineſs that always correſponds with this Deſire at the time of its Action, and affects him with a ſtrange perturbation for which he cannot account. Avarice ſeems more particularly to be an appetite of this kind. It can be referred to none of the more natural Paſſions, that are implanted in us for peculiar uſes in life, but ariſes from an undue eſtimation of a particular object. The effects of it upon the Body are very apparent, and perhaps offer as illuſtrious an example of the great influence of theſe Affections as any that

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can be produced. A general waſte and decay of fleſh, depreſſion of ſpirit in the higheſt degree, loſs of appetite, and defect of ſleep, a certain meagre and worn-out countenance, and continual diſorder are its genuine conſequences. But it ſo happens, that the moſt ſatisfactory advantages of health and long life, are enjoyed in the greateſt perfection by thoſe who are leaſt anxious for ſublunary enjoyments.

WE ſhall now examine the more particular Paſſions, to which Names have been affixed; and in this conſideration we ſhall not attempt at once to explain their immediate Actions, or the conſequences that are deducible from them. We ſhall be content, with demonſtrating the moſt viſible and apparent effects we ſee produced by them in the ſyſtem. And as in the former inſtances of the Power of the Imagination, we ſhall principally attend to the Senſations that we are conſcious of from this ſource.

WE ſhall begin with thoſe that are the leaſt tumultuous, or occaſion the leaſt violence in their effects; and not as they are involved in Deſire. And this, becauſe we are not to give a mere deſcription of the Paſſions themſelves, but of the effects they induce upon the animal Conſtitution.

THE firſt then that offers itſelf, is that affection that reigns reciprocally between the Sexes or LOVE. Nothing can be more evident than the powerful influence this Paſſion has over both the Mind and the Body. It excites a general Irritation, and often a Senſation likewiſe over the whole ſyſtem; but more particularly in the part of Gratification. From this circumſtance, many have been willing to deduce this Paſſion from a latent Stimulus, or a previous corporeal Affection. The Deſire is often ſo apparently connected with ſomething of this kind; that it is no wonder they ſhould conſider it in this light, eſpecially when

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it appears to be a Paſſion inſtituted to diſcharge itſelf of a Secretion, the final cauſe of which is ſo neceſſary for the preſervation of Animals. It is not to our purpoſe, carefully to diſcuſs this queſtion. It will be ſufficient for us to ſhew; that at a time when our Deſires are calm and eaſy, and we find the influence of no Stimulus, or are affected with no Senſations of this nature; the idea of an amiable Object ſhall immediately excite this Deſire, affect us with ſtrong Senſations, and cauſe very powerful Emotions. It may be obſerved further, that theſe effects ariſe from the groſſeſt idea we can affix to this Paſſion, and which has a view to Gratification only. But when it becomes a generous Affection, from which higher advantages are expected, the whole ſyſtem will be brought into agitation, and a general ſhivering in every part, tremblings of the limbs, palpitations of the heart, an irregular pulſe, paleneſs of the countenancc, and in the more delicate Sex often faintings and languor, will be the

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product of this Paſſion. Are not theſe ſurprizing conſequences indebted to an affection of the moſt noble principle of our nature? If not, to what corporeal or mechanical influence ſhall we aſcribe them.

IT may be worth our attention in this place to conſider, that *Friendſhip* even, grounded upon Paſſion ſo far, as that we deſire the company and converſation of thoſe whom we eſteem, as well as the more noble affections of *compaſſion* and *benevolence*, may produce ſimilar effects in our corporeal frame, may excite it to action, and be the author of very conſiderable Senſations. We are ſenſible of a peculiar feeling, upon the approach of an abſent friend, and every one of the leaſt ſenſibility knows how an object of compaſſion affects us. The ſame event, though attended with a different Senſation, is obſervable from the oppoſite paſſions of Hatred and Averſion. Theſe, whenever they ariſe, not only excite others to the injury of the object of them, but

in themſelves produce very forcible Senſations, upon the reflection or ſight of thoſe againſt whom they are levelled.

FROM this we proceed to conſider the peculiar Actions produced by *Envy* and *Jealouſy*, whoſe viſible effects are no leſs conſpicuous. Theſe Paſſions ſeem to be the ſame with regard to the effects they produce, both upon the Mind and the Body. They ſeem to differ only in the objects towards which they are excited. Envy has for its object the perſon that enjoys any peculiar good, whilſt Jealouſy is raiſed more particularly againſt the good itſelf which is enjoyed. But Jealouſy is not always to be obſerved where there is Envy, though the latter always accompanies the former affection. Jealouſy is generally confined to perſons, and may be ſaid to be a *ſpecies* of Envy. Their viſible effects however upon the Body are the ſame as we have beforementioned, frequent tremblings, and palpitations of the heart, eſpecially upon the

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ſight of the object, proſtration and loſs of appetite, as well as ſleep, an involuntary conformation of the muſcles of the countenance, which eſtabliſh an habitual deformity, the production of very violent diſorders, extreme and terrifying convulſions, and often the fatal conſequence of death itſelf.

THE next Paſſion we ſhall take notice of, is *Hope* and *Fear*. With reſpect to the Mind the ſame Paſſion, and differs as the laſt in the objects upon which they are exerted. The difference however is eſtabliſhed upon an oppoſite principle. They were both paſſions of Averſion, but theſe differ as one affects the Goods of life, the other the Evils of it. Their effects upon the Body, at firſt view may not ſeem to reſemble each other ſo much as might be expected; but when we come to enquire into their immediate effects, they may be found to be much the ſame, and differ only in the degree of violence in the Action.

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The final cauſe of this is very evident, there are ſo many more important things to fear than to hope for. Hope directing us always to good, occcaſions in us a pleaſing Senſation; and although in itſelf it is an uneaſineſs which would fail to give us pleaſure, if it aroſe from any other ſource, yet as it is directed by this Paſſion, the pain is over-looked and diſregarded, and it is eſteemed a pleaſure. So uncertain are the foundations upon which we build that happineſs that reſults from our bodily feelings. There is commonly a kind of nauſea, with which we are affected from this Paſſion, and it is often attended with conſiderable ſhiverings and tremors. But the effects of Fear are much more evident: This Paſſion is excited in a degree always equal to the importance of the object, which is no leſs than life itſelf, the bleſſing from which ariſes every enjoyment, and every enjoyment that ariſes from it. A faultering tongue, a trembling lip, a diſtorted countenance, an erection of the hair, convulſive

ſive limbs, a throbbing breaſt, an univerſal agitation, and relaxation of many muſcles, an undue tenſion of others, and in general, an inability to think, to move, and act like a ſenſible creature, are its common effects. It often puts on more particularly the form of the paroxyſm of an intermittent fever, from a violent conſtriction upon the ſurface of the ſkin. By which it ſometimes terminates in this diſorder, or produces death itſelf. And thus the *coward* meets with that fate which it was his whole concern through life to prevent.

WE proceed immediately from this Paſſion to that of *Shame*, which is a Fear grounded upon ſomething wrong, which we perceive in ourſelves, and which we are afraid of diſcloſing to mankind. This could not be paſſed over without a particular attention, as it is a paſſion the moſt noble perhaps of human nature, and which has an evident and particular effect upon the human body. I mean in the affection of

Bluſhing, which may be excited in all who have not entirely loſt every degree of delicacy, and ſenſibility of wrong and improper actions. We cannot avoid obſerving, that notwithſtanding this effect is attended with a very diſagreeable feeling; yet we reflect upon it with the greateſt pleaſure, becauſe it can be excited only in honourable minds, and the defect of it is the higheſt diſgrace to our nature.

THERE is no paſſion ſo violent in its effects, or ſo fatal to human nature as *Anger*; and as in the moral world it may have been the ground-work of the deſtruction that has been made in it; ſo in the natural conſtitution, it has often proved a powerful inſtrument in the quicker and more ſpeedy ſolution of animal life. Is not this univerſal prevalence of it owing to the confidence we have in our own judgments, which can bear nothing contradictory or repugnant to them. Its effects upon the body are the moſt viſible of any other paſſion, becauſe it not only occaſions a violent action

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in the involuntary parts, but counter-acts in ſome meaſure the power of the Will, and obliges her to act quite contrary to her own intentions and deſires. Hoffman has given us this deſcription of its effects, which is too elegant to be omitted or replaced; we ſhall therefore give it in his own words:— "Flagrant, emicant que oculi, multus ore in toto rubor eſt, labia quatiuntur, dentes comprimuntur, ſurgunt capilli, ſtridet ſpiritus, gemitus, mugituſque ut parum explanatis vocibus, ſermo præruptus et comploſæ ſæpius manus et pedibus pulſata humus, fœda viſu et horrenda facies depravantium atque intumeſcentium." Which may be thus rendered into *Engliſh*, "The eyes ſhine and are all on flame, a ſettled fiery redneſs invades the whole mouth, the lips ſhake and quiver, the teeth are claſped together, the hair ſtands erect, reſpiration is ſonorous, the voice hoarſe and unnatural utters inarticulate words, the ſpeech is interrupted, the hands clinched, and very often the feet beat and ſtrike the ground

with violence, the countenance horrible and ſqualid, ſwells and becomes deformed." Beſides this, the heart palpitates, the pulſe quickens, and a temporary fever is produced. To this there often ſucceeds bilious vomitings, which are acknowledged as the diagnoſtics of this paſſion, by the bitterneſs in the mouth, and the violent pain about the *ſcrobiculum cordis*.

To conclude this account of the Paſſions, we muſt take notice of the effects of *Joy* and *Sorrow*. Theſe affections, although they excite the ſame actions as the more general paſſions, yet cannot ſtrictly be eſteemed as ſuch. Joy ſeems to be rather a completion of deſires, than as involving any particular ſort; but ſorrow will not admit of the ſame exception, for it is founded entirely on Averſion, which can never be ſaid to ceaſe whilſt this Affection continues. The effects of both upon the body are very conſiderable: Joy will take away all preceding pain, and ſometimes reſtore

ſtore a diſeaſed body to health. It will often likewiſe, when violent, in a healthy body induce diſeaſe, and ſometimes be productive of death itſelf. By that riot it occaſions in our ſyſtem by various viſible effects, by an agitation ſimilar to what is occaſioned by Love, and by an involuntary convulſion of many parts; it becomes too violent for one of a tender nature. Hence it is dangerous for ſome perſons to hear good news, when they are not previouſly warned of it. The forcible effects of Sorrow are more common and more obſervable, becauſe they ariſe from diſagreeable cauſes; and hence it happens, that the flow of Tears, ſo frequently owing to this affection, is the ſooneſt corporeal action almoſt, that is ever produced in us. But the Tragedy does not always end here. They are ſucceeded by nauſeas, convulſive tremblings, and palpitations of the heart, which rack and torment the conſtitution, and introduce the worſt of conſequences. Two effects may be remarked as peculiar

to theſe paſſions; one is a ſlowneſs of the pulſe, the other a great flow of ſaliva*. Many authors of the greateſt credit have obſerved theſe effects; hence it was incumbent on us to take notice of them as the conſequences of Anxiety. Notwithſtanding however they are unaccountable in ſome meaſure, and not reconcileable to any diſtinct theory.

IN this view of the paſſions, we have not attempted to give accurate deſcriptions of all the effects that are produced by them in our ſyſtem. It will appear hereafter, that by this examination we want only to ſettle a point of Theory in which it was neceſſary to diſtinguiſh the leading facts, and thoſe that moſt reſemble each other. This we hope we have done, and are ready therefore to proceed to a further elucidation of the ſubject.

* To this may be added a coſtive Habit.

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SECT. IV.

Of the Method by which Imagination and the Paſſions excite Actions in the Body.

WE have already laid before our view, many effects proceeding from Imagination as the cauſe of action in the corporeal ſyſtem; it is neceſſary therefore, that we ſhould now enquire, if poſſible, into the manner by which they are produced. And this muſt be done by tracting them up to their original ſource, and the primary actions we ſee produced in the animal body. We cannot, it is true, dive into thoſe moſt ſecret powers that are exerted over us, and obſerve how the connection between ſoul and body is eſtabliſhed and ſupported. But ſtill we may go further, than we have already done in this Enquiry; and although we cannot ſo effectually prove the immediate Action

of the Mind, as in ſome former inſtances, yet a very ſtriking Analogy with them may lead us very far in determining the truth.

IT will be granted, that the conveyance of all Senſations to the Mind, and the propagation of Motion from it, through the ſyſtem, is performed by means of the nervous influence, and that over this power the Mind has a free and unlimited authority, except when diſorder has interrupted its progreſs through different parts; or by the ſluggiſhneſs of the Body, it is made unfit for motion. The Mind, however, we have already ſhewn, never acts wantonly or without ſome motive, and is always paſſive, until it is excited to action by this means. Some foreign body that applies itſelf to our conſtitution, and excites it to act in order to expel it, is the firſt motive to action in an Animal. This is what we underſtand by the name of Stimulus; whether it acts upon any of our external ſenſes, or internally and influences our general functions,

functions, or by a very great acrimony cauſes pain and uneaſineſs. The moſt ſimple action of this kind we have called *Irritation*; when it becomes conſiderable enough to excite conſciouſneſs, we denominate it *Senſation*; and when it is principally engaged with particular objects, and in a peculiar organ, we call it *Perception*. In conſequence of the two laſt of theſe affections, Ideas are formed in the Mind, Paſſions ariſe, and the Soul exerciſes all its faculties. The higheſt power of the Mind is that of the Will, and differs very much in its action from ſimple Irritations, in the motives that induce, and the parts upon which its agency is exerted. The Action that proceeds from Imagination and Paſſion, ſeems to be a middle kind of Action between theſe two, and differs from both in Degree only. It ſeems to agree with the Action of the former, as ariſing from Ideas and a mental Principle, and yet it reſembles the latter by acting upon the ſame parts. It differs only in being influenced by no ſtimulating

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Body from the Actions which would, if that were preſent, be cauſed by it, and hence we may preſume to determine its Actions to be of the ſame nature. But as this diſtinction ſeems very obſcure at firſt ſight, and will be difficult to aſcertain without further reaſoning.—Let us endeavour, if we poſſibly can, to diſcover the Analogy between the effects that ariſe from *Imagination*, and thoſe that are acknowledged to proceed from a *Stimulus*, and hence deduce by reaſoning the poſſibility of the reſemblance.

1. THE firſt viſible effect that a *ſtimulus* occaſions, when applied to our Bodies, is a conſequent *Irritation*, or a Motion in the animal Body, which is generally perceptible, either in the part affected or in ſome diſtant one. The firſt of theſe is evident upon the application of any ſubſtance to the ſtomach or inteſtines, and the latter in the action of Sneezing, by an irritation of the diaphragm. The idea of a Stimulus will cauſe the ſame kind of Actions. Who is

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not ſenſible of an inability to prevent the twinkling of the Eye-lids, from the view of any thing dangerous offered to be thrown at us, although at the ſame time we are aſſured that no danger will ariſe from it. In the ſame manner, how many people are equally affected with the idea of Vomiting, as if an Emetic had really been exhibited. The Paſſions likewiſe cauſe ſimilar irritations. Thus the Heart itſelf is moved violently in a time of *fear* or *anger*, the Blood-veſſels are ſtrongly irritated in the Bluſhes proceeding from *ſhame*, the erection of the *Penis* ariſes from Motions in its ſmall veſſels, excited by peculiar ideas, and many other Actions are performed in the Body, which are ſufficient teſtimonies of ſuch a Motion cauſed by theſe affections.

2. THE next viſible effect ariſing from a *ſtimulus* is Senſation. Every Stimulus indeed does not cauſe a Senſation, becauſe the Body is ſo conſtituted that we ſhall have no

feelings of any of thoſe Actions which are abſolutely neceſſary for our conſtant preſervation. In many caſes, however, it does produce Senſations. Thus every one knows what is meant by *feeling*, from acrimonious bodies, and can determine the nature of Pleaſure and Pain. Senſations, however, no more than ſimple Irritations, are confined to the place where the Action is firſt begun, or where the Stimulus preſents itſelf. Nothing is more common than its appearance in very diſtant parts. Thus Pain in the Head often ariſes from a diſorder in the Stomach, and Pains in the Stomach from other Bowels that are affected. The ideas of ſtimuli affect us with Pain as well as the Stimulus itſelf. Thus ſore Eyes have been induced from looking at another perſon affected with that diſorder; and we need not repeat again the inſtance of Pain from reflecting on an Amputation, or any painful diſeaſe. The *paſſions* too very often create very ſtronge bodily Senſations. Fear is accompanied with a Pain in the Sto-

mach or Nauſea. Anger occaſions a Head-ach, and Pains about the Heart. Luſt excites a grateful Senſation in the part of Gratification. Shame raiſes a violent Heat and glow in the Face; and Anxiety is the cauſe of various uncertain Pains in different parts of the Body.

3. ANOTHER effect, that is perceptible in our ſyſtem, which ariſes from a *ſtimulus*, is a more copious *flow of humours* than was uſual in ſome part or other of the Body. This is particularly evident when it is applied to any *ſecretory* organ: As for inſtance, when applied to the Eyes, it cauſes Tears; in the Noſe, a copious flow of its own mucus; in the Mouth, of ſaliva; in the Stomach, of the *gaſtric* liquor; in the Inteſtines, bilious and pan-creatic juice, in the Kidneys, Urine, &c. The ſame may be alledged of the ideas of theſe ſubſtances, when they act upon ſeveral parts. Thus the idea of grateful Food occaſions the Saliva to flow in great abundance, and many

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are the ideas that are liable to produce an involuntary ſecretion of Urine. The Paſſions have alſo a very powerful effect in this way. Fear, Anger, Jealouſy, and eſpecially Sorrow, nay ſometimes Joy, excite a copious flow of Tears; but it is moſt peculiar to Sorrow, which is accompanied likewiſe with an increaſe of Saliva. Other paſſions have alſo their peculiar Secretions. The urinary Organs ſeem appropriated to Fear, and the ſeminary Secretion is dependent upon one appetite alone.

4. A FOURTH effect that evidently ariſes from a Stimulus, when it acts upon our bodies, is a Conſtriction or *Spaſm* of the part to which it is applied, and ſometimes of the whole Body. Partial effects of this kind, however, are moſt common, as they ariſe from ſlight cauſes. They may moſt frequently be obſerved in Burns, but ſometimes from Cold likewiſe. Univerſal effects generally proceed from this latter cauſe, and are always preſent whenever we are expoſed

poſed to any violent degree of it. Cold, however, can act only in this inſtance as a Stimulus, becauſe any other body of the ſame nature might be productive of it, as is evident in the Paroxyſm of an intermittent Fever, where a Stimulus may ſometimes be the cauſe of this diſeaſe. This effect indeed, is not accompanied at the time with either Motion or Senſation, but it ſeems to be the ultimate effect of an Irritation, and reſembles more the event of a ſedative rather than a ſtimulating power. But may not this afford us a conjecture, that every ſedative power is only the exceſs of a Stimulus, or that the violent effects of Stimuli, always prove ſedative. It may ſuggeſt likewiſe another ſuppoſition, that Sedatives act by cauſing a Spaſm. But to proceed with our ſubject, The imagination or ideas of Stimuli, may in the ſame manner influence our Conſtitution, and be attended with the ſame effect: But it is moſt evident from the Paſſions, which always produce it. Fear is known al-

moſt

moſt by this effect; Anger is frequently attended with it, and every palpitation of the Heart, an effect ſo univerſal in every Paſſion, derives its origin from this ſource alone. From what beſides this, can the Bluſhes ariſe in *ſhame*; and to what ſhall we attribute the various convulſive Motions that are ſo frequently obſerved, but to a ſtoppage of the vital influence from ſuch a Conſtriction? Is not the ſlowneſs of the Pulſe likewiſe in Anxiety an effect of the ſame original, and how is Death itſelf accompliſhed but by this means?

5. THE fifth and laſt effect that we ſhall mention of a Stimulus, viſibly acting within our bodies, is a conſiderable increaſe of the Actions of the vital Powers, by which are meant the Heart and Blood-veſſels. Parts of our ſyſtem indeed of the utmoſt importance, upon which it is entirely ſupported, and whoſe deviations from what is right, affects us more immediately with diſorder, than the injury of any other function.

tion. This diſtinction was moſt certainly included in the firſt that we adduced of the effects of Stimuli upon us; but it is worth while to conſider it apart, as the Analogy we could wiſh to ſettle will appear the moſt evident from it, and as the paſſions have a peculiar influence upon theſe powers. It has been diſputed, whether their action is always dependent upon a Stimulus; but we ſhall enter no more into this queſtion, it is very evident that when any extraordinary body of this kind affects them, it quickens and expedes their motion. This is clear, not only from the probable effect of Acrimony, when it obtains in the ſyſtem, but from the experiment of the learned and judicious, upon brute Animals, where ſuch things could very eaſily be applied. Whenever indeed, Stimuli act upon theſe powers whilſt entire, they never raiſe any Senſation, and it is ſo ordered that we ſhall have no conſciouſneſs or feeling in them, but from an accelerated motion. We argue concerning their pre-

ſence therefore *a priori*, that if Stimuli are neceſſary to excite actions, and we ſee an additional force produced, it is a proof of the preſence of ſuch a ſubſtance to occaſion it. The argument will be more ſatisfactory, with regard to the influence of the paſſions, becauſe we can evidently perceive them preſent at a time that the force of the Heart is increaſed. Anger ſeems to be the moſt powerful paſſion in this reſpect, for it always produces ſomething of this nature, is often accompanied with a temporary fever, and ſometimes terminates in the worſt of conſequences. Fear is likewiſe productive of the ſame effect, and all thoſe other paſſions that create Spaſms, Convulſions, and Palpitations. But it muſt be obſerved, that in theſe laſt inſtances it is produced in a ſecondary way, and as dependent upon thoſe prior conſequences, that form a reſiſtance to the vital Powers, which requires the higheſt of their abilities to overcome.

To explain the method by which the Mind can produce theſe effects, ſimilar to what are excited by a Stimulus, is not ſo difficult as might appear at firſt ſight. If there is a particular power in the animal Body, which is excited to motion independent of the Mind, if the irritable part of of our nature is induced to action from Elaſticity, or any other mechanical means, and if Stimuli act by ſome relation to it, the whole of our reaſonings will fail, and be of no uſe; but if all action proceeds from a mental faculty, and the action of Stimuli, as we have ſhewn, proceed from it likewiſe; our theory will eaſily be eſtabliſhed. The Mind is to be conſidered as the prime agent in all caſes, and the whole difference of action is in the motives which excite it. When a Stimulus acts upon the Body, the Mind in conſequence re-acts upon it, and in this caſe this ſubſtance is to be conſidered as the motive which induced the action.

But it is not neceſſary, for the Mind always diſpoſed to act, may meet with others that can produce the ſame effect. Every thing that can poſſibly affect the Mind, may conſtitute the motives to its action. Imagination and Paſſion certainly have this power, and hence we deduce their influence in thoſe motives which we have mentioned. We have ſeen their preſence, unreſtrained by any peculiar organ; and have found a reſemblance between theirs and the common actions of ſtimulating ſubſtances. We have liberty then, I think, to imagine they have a licence to range over that vaſt field which acknowledges ſuch a power, and to become equally vigorous in producing the ſame kind of actions.

IT may be worth while to mention, before we leave this ſubject, another circumſtance, in which theſe actions reſemble each other; and that is as they refer to our Conſciouſneſs or Senſation. The mere ideas

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of a Stimulus or any acrid Body, are accompanied with a ſeeming Conſciouſneſs of ſuch a ſubſtance; but it is not ſo with the Paſſions, they ariſe from a pure effort of the Mind, without referring to any material ſubſtance, and hence, previous to their action, we perceive no ſenſation in the Body. We feel, however, the actions or conſequences ariſing from them in the ſame manner as we do thoſe of ſimple Irritations. The reaſon of this is evident, Paſſions ſeem to act on thoſe parts of the Body, whoſe continual exerciſe is neceſſary for the preſervation of life, and therefore are made inſenſible to any Stimulus; but the Imagination muſt act upon the ſenſible parts, which have no neceſſity for any regular uniform Motions.

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SECT. V.

Of the influence of Imagination and Paſſion over the Functions and Diſorders of the Body.

THE extent of theſe powers is ſo great, that it would require a very large volume to examine into every particular concerning them. We ſhall content ourſelves therefore with ſome few remarks upon the principal kinds, from which every other may eaſily be deduced. We ſhall begin with ſome of the neceſſary Functions of our ſyſtem, which acknowledge their influence to expede or retard them. Such a conſideration naturally ſuggeſts itſelf, for we have ſeen *a poſteriori* that theſe powers enjoy a great authority over the whole Body, and from *priori* that the irritable part of it is entirely under their direction. And it is from this part, indeed, that we

may

may imagine the Body is preſerved in that ſtate of perfection we find it poſſeſſes; that nouriſhment is promoted, every ſecretion and excretion performed, and the general circulation of the fluids maintained. We ſhall not take particular notice of theſe general functions, by which the vital powers are governed, becauſe we have ſo often demonſtrated them in the courſe of this work. We muſt beg leave, however, to offer ſome thoughts upon an effect that may proceed from them as a cauſe or principle of action. This is the various *temperaments* of mankind, which form ſo great a diſtinction between the particular ſpecies. It has been uſual, to deduce the different affections of the Mind from theſe temperaments of the Body, and that theſe being formed by a mechanical cauſe, all the variety of Tempers, Diſpoſitions, and Paſſions have ariſen from them. With equal juſtice, we may reverſe the diſtinction, and from what we have advanced, demonſtrate that the difference of Temperaments

is owing to the Paſſions and Diſpoſitions. Theſe are always correſpondent to Ideas, depend upon them, and ariſe in the Mind, in conſequence of the advantages or evils that are apprehended in their objects. The mere corporeal frame, can ſuggeſt no other ideas but its own feelings, and hence is no otherwiſe the cauſe of paſſions, than as by it we perceive objects either with eaſe or difficulty. In general, according as they are preſented in greater or leſs number, or differ in their own character, with reſpect to utility or advantage, the different paſſions ariſe. But there is no neceſſity for any change of the Conſtitution to produce them, that is only an effect that afterwards proceeds from their influence. In order to confirm what we have ſaid, we may obſerve, that the paſſions correſpond very much to the ages and ſituations of life. Love is the paſſion of Youth; Ambition of riper Years, and Avarice of old Age. But can theſe paſſions in ſuch circumſtances ariſe from any prior effect induced in our ſyſtem;

ſyſtem; or do they not entirely depend on the ideas that are ſuggeſted at ſuch ages? What Conſtitution can we ſuppoſe requiſite, or what is there neceſſary in the body of an old man, that without reflection ſhould incline him to a covetous diſpoſition? But this paſſion may very eaſily be accounted for from the apprehenſions of this aged perſon, from a conſciouſneſs, that his abilities are impaired, and his capacity to maintain himſelf deſtroyed; and in conſequence of this that the only means to make his life eaſy, is carefully to preſerve what he has already obtained with ſo much induſtry. Beſides this, how is it poſſible, that a difference in the circulating fluids, of which we are not ſenſible, ſhould influence our paſſions, when they depend entirely upon ideas. We have ſeen very clearly that Paſſion has a great influence upon our Bodies; and hence, when we perceive two actions preſent at the ſame time, one of the Body, the other of the Mind, is it not moſt rational to ſuppoſe that to be the

cauſe

cauſe of the other, which we know can act, than that of whoſe abilities we are quite uncertain. But, not to dwell any longer upon this ſubject, the different temperaments, as well as paſſions, are perhaps abſolutely independent of each other, and are only effects proceeding from the ſame original cauſe, viz. the almighty hand of the Creator. As the paſſions, however, have a conſiderable influence over our bodies, when they are conſtant or violent in their actions, they may obſtruct the general temperament or promote it, and introduce an alteration into our Conſtitutions. And this may very eaſily be done, from any other ſource that we may imagine temperament to ariſe, either a difference in the circulation of our fluids or in the fluids themſelves, that are carried through the ſyſtem, for both depend on the irritable part of the Conſtitution.

IT will be of more importance to conſider the influence of Imagination and Paſ-

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ſion upon the ſeveral Secretions, where it can be more diſtinctly marked. It has been ſufficiently proved by the late very ingenious Dr. WHYTT, that it is by a ſenſible, or according to our ideas, by an irritable power, that the actions of the ſmalleſt veſſels are carried on in our bodies, and that this power depends upon the nerves, and a mental influence. If this is abſolutely the ſtate of the caſe, we may argue *a priori* that the Imagination has a very forcible effect, in promoting or retarding the different Secretions. But the fact is true from experience. The Tears are ſecreted in a much greater quantity, when we are affected with grief than at any other time. They have been obſerved to flow in many perſons for days and weeks in great abundance. The ſupply in ſuch a caſe muſt be very conſiderable, if they had been already depoſited in any receptacle for that purpoſe, and the greateſt inconvenience would have accrued from their ſtagnation, if objects had not frequently occurred to occaſion their flow.

Many

Many perſons never weep from the want of circumſtances to occaſion it; but yet we cannot ſuppoſe they are devoid of the proper organ for this purpoſe, neither are they leſs ſubject than others to diſorders from this ſource. Beſides this, Fear cauſes an increaſed ſecretion of Urine; Anger, of Bile; Anxiety, of Saliva and Luſt of the Semen; ſo that each of theſe paſſions may be diſtinguiſhed almoſt by ſome particular Secretions that are adapted to them.

WHILST we are upon this ſubject, we may take notice of the influence of the Mind, in the production of the adeps, or oily part of our body, which we may very juſtly call a Secretion. We ſee the increaſe of this ſubſtance in a great meaſure dependent upon a chearful and lively diſpoſition, which engages in a few diſagreeable ideas, and is a ſtranger to Anxiety and Care; whilſt Grief and Sorrow, or troubles of any kind, tend in a great meaſure to ſuppreſs it, or to diſſipate it. They have moſt

probably

probably the latter effect, and the violence of the paſſion excites an overflow of the Secretion. We may draw an Analogy between this effect, and the flow of Tears, which is cauſed by Anxiety; with this difference, however, that the ſecretion of Fat, as of more uſe to the ſyſtem, is accumulated when it is not carried off by the influence of that paſſion. From *Grief* indeed we may deduce an univerſal power of increaſing Secretion, and of diſſipating the effects of it. The Tears, Saliva, and Urine, evidently admit of this circumſtance; why may not the Fat be a product of the ſame kind, and imperceptibly be waſted and carried off by the ſame means? If this is true, how evident is the force of Imagination upon the ſecretory Organs? We cannot conclude this ſubject without a further obſervation, that the Secretions of the Tears, Urine, Saliva, &c. may be conſidered as having Excretories that conſtantly attend upon them, over which the Imagination has an equal force. The Adeps, however,

however, has no peculiar Excretory of this kind, but the pores of the ſkin perform this office, are viſibly directed by the ſame power, and are influenced in a very peculiar manner by Grief and Sorrow.

BESIDES, thoſe general functions, we have already mentioned, we may take notice of ſome others which can be reduced to no particular heads. Of this kind is an affection of our bodies, which ſeems to poſſeſs a very great influence over their motions, and therefore deſerves our particular notice. This is a ſympathy, or affection in the ſenſible, as well as irritable power, in diſtinct parts, from where the firſt impreſſion was excited. Dr. WHYTT has evinced it, almoſt by a demonſtration, that it is not owing to the communication of nerves; but demands a more immediate mental influence. But a ſenſe of utility and advantage, or a natural impulſe to aſſiſt particular operations, can never be ſatisfactory to any theory, but as it appeals to

original

original ideas. In fact, this affection very much reſembles the effects produced by Imagination; and from hence we may preſume to conjecture, that it is a ſpecies of that action we have deduced from it. And if it is ſo, it ſerves very well to illuſtrate ſome other effects produced by that power.

IT is not only whilſt we are living and acting, and receiving impreſſions from different objects, that Imagination interferes in the functions of our bodies; but it acts even whilſt we remain in a dormant ſtate of inactivity, in the womb of our mother. Hence it is, that we ſee the violent effects of paſſion upon the child, as it is brought into exiſtence, as well as upon the parent that brings it into the world. From this many peculiar circumſtances may happen, which otherwiſe cannot be accounted for, as deformities and connate diſorders. But the moſt ſtriking effect is what proceeds from a very forcible deſire of a particular object.

object. This phænomenon will be very difficult to explain as well as conceive; becauſe it is an effect produced in the body of another, ſuperior to what is produced in ourſelves, by any influence of Imagination. It has been the faſhion of late to deny this theory, and even to exclude it from any ſerious attention. There are few theories indeed in which it can be included, and Mechaniſm is certainly contradictory to any ſuch effect. We ſhall not pretend to demonſtrate the truth of the fact, an accident, or many other circumſtances, may induce us to imagine reſemblances, which cannot be ſupported, when things of this nature have happened. If we ſuppoſe, however, that the bodies of the Fœtus and Mother, when joined, not only enjoy the ſame circulation, but that there is an equal connection between the ſolid and firm, and of conſequence the nervous and irritable parts of both ſyſtems; we may then ſuppoſe that the Mind of the one may have an effect upon the Body of the

the other, and make a particular alteration in its ſyſtem, with which afterwards we form a reſemblance with an object, that might in the time of pregnancy be deſired. We may likewiſe imagine ſome effect of this kind, from another ſuppoſition, viz. a ſympathy that may prevail between the correſponding parts of both bodies. There is another circumſtance, which I think as difficult to be accounted for, which is the reſemblance between Parents and Offspring, but which no one has pretended to deny. I leave then the former queſtion to be determined by thoſe who are ſkilful enough to explain the latter phænomenon.

IT remains now to conſider only the Diſorders of the human Body, which the power of Imagination is capable of producing in it, a vaſt and important field, the verges only of which we ſhall paſs over, by deducing them from the cauſes which we already mentioned. Moſt diſeaſes depend upon the irritable part of our ſyſtem,

in conſequence of this we might derive all of them from this ſource. This, however, we ſhall not attempt at preſent, we ſhall only endeavour to ſhew how Imagination produces thoſe, in which we ſee it acting as a cauſe, or where there is great reaſon to preſume upon its power.

THE moſt common diſorder of the human conſtitution, the quickeſt in its ſolution, and moſt fatal in its conſequences, is *Fever*. If we examine into the common cauſes of this diſtemper, we ſhall find it ariſe either from the preſence of ſomething acrid, immediately to promote the vital influence, or from ſome obſtruction to its power, which requires the violence of this diſorder to diſcuſs. Theſe obſtructions may proceed from a preter-diſpoſition of the body, or from a ſpaſm upon the ſmall veſſels, induced by a ſtimulus. We have already ſeen that the paſſions act in a manner ſimilar to this ſubſtance, and from experience, we find that this diſorder is pro-

duced

duced by them. But as ſtimuli act very differently in producing the various kinds of Fevers, ſo do the Paſſions. Anger ſeems to act by an immediate influence upon the heart, by exciting it to a quicker motion; ſo that the Fever of a man, ſubject to it, is often temporary, like what attends drunkards, and is not accompanied with a cold fit. Sometimes, indeed, by the violent commotions it raiſes, it forms obſtructions, by forcing the blood into the ſmall veſſels of different parts, and thus occaſions Pleuriſies, Peripneumonies, and other topical inflammations; or inſtead of theſe, it creates an overflowing of the Bile, which mixing with the Blood, puts on the appearance of Fevers, proceeding from that ſource. Fear ſeems to act in a very different manner; for it appears in the form of cold, or a very violent ſtimulus, which deſtroys the tone of the fibres, and induces a ſpaſm or conſtriction over the whole conſtitution, and upon this account it occaſions moſt commonly that ſort which is intermittent. An-

xiety again, acts in a much ſlower manner, and by its gradual influence tends to procure alterations in the circulating fluids, and thus brings on thoſe of a putrid and malignant, as well as the ſlow and nervous kind. It produces theſe diſorders likewiſe from a ſpaſmodic quality, by which it enables the body more readily to imbibe and retain contagion and mias mata.

WHEN we reflect upon the number of diſorders which are attended with Fever, we ſhall not be ſurpriſed to find, ſo many that occur from the paſſions of the Mind. But beſides theſe, they have been found to poſſeſs a very conſiderable influence over thoſe that are called chronical, or more properly, what are free from this general diſorder. Nothing is more common than for latent *ſchirri* to be rouzed by a fit of paſſion, and become *cancers*, when no other cauſe could poſſibly interfere. This is moſt probably effected by creating an Irritation in the ſmall veſſels, where the obnoxious matter

matter lies, and raiſing a circulation in fluids, which whilſt they were ſtagnant, were innocent. Rheumatiſm and Gout likewiſe have often been obſerved to be very much affected and promoted by the ſame means. And this may happen, whether theſe diſorders are occaſioned by a peculiar matter ſeparated from the blood, or an affection of the living ſolids. The arthritic matter, if it is allowed, may by theſe active powers, be driven from its receſs, and lodged in the parts where we ſee it raging. In the ſame manner *Calculi* of the Bladder and Gall ducts may be formed. They no doubt very often ariſe from a conſtriction upon the urinary and hepatic paſſages, which leſſens their diameters, and unfits them to carry off the matter that forms the Calculus, and which in conſequence of this is depoſited where it is found. A Phthiſis of the lungs often ariſes from conſtrictions, and not only of theſe, but of the diſorder itſelf, the paſſions have been found to be an evident cauſe. And

in fine, we have the authority of very eminent Phyſicians, that the Hydrophobia, which ſeems to be a ſpaſmodic diſorder of the throat, ariſing from a particular ſtimulus, has often ariſen from theſe cauſes, when no infection was received from any mad animal, or any of the human ſpecies which had previouſly been infected.

BUT thoſe diſorders merit our particular attention, which have been aſcribed to ſome violent affection of the nerves, or injury of the brain itſelf. Thus *Apoplexy* and *Palſy* ſeem to be owing to a preſſure upon that ſubſtance, whilſt the more ſpaſmodic and convulſive diſeaſes owe their riſe perhaps to the irritation of a ſtimulus. We ſee however all of them produced by the exceſs of our paſſions; but it is moſt reaſonable to ſuppoſe that the former, are not ſo much the immediate as the ſecondary effect of their influence, in the ſame manner as they produce *death* itſelf. It is not

in the leaſt ſurprizing, that by the violent commotions, that are raiſed in the ſyſtem, the blood ſhould be driven into the ſmall veſſels of the brain, and that this tender ſubſtance, incapable to expel it immediately, or to raiſe an inflammation for this purpoſe, ſhould be affected with theſe diſorders.

THE ſpaſmodic or convulſive affections of our ſyſtem, of which the chief is Epilepſy, may proceed from the immediate action of the mind. We have ſeen already that convulſions and palpitations of the heart proceed from almoſt every paſſion, and when they have been raiſed to their greateſt height, ſo as to produce thoſe diſorders which rage often the worſt in the human conſtitution, they have been attributed to paſſions of various kinds. Many caſes of Epilepſies may be deduced from HOFFMAN and other writers, where no other cauſe could poſſibly interfere. But not to dwell too long upon this ſub-

ject, we ſhall conclude it with an example from Dr. WHYTT's late very ingenious Eſſay on nervous Diſorders. In that Treatiſe he produces a very beautiful inſtance of a young man, who was ſeized with a Catalepſy, from a diſappointment in Love, and was recovered from it, only by a promiſe that he ſhould enjoy the object of his affection. It has been imagined by ſome, that theſe diſorders proceed from a ſtimulus that diſagreeably affects the nervous power, if this be allowed, our ſentiments will not only be eaſily inferred from it, but they will tend to illuſtrate that theory.

OF the ſpaſmodic and convulſive, or what are called nervous diſorders, are the Hyſteric and Hypochondriac Affections. Theſe have generally been conſidered as the ſame, and have been thought to differ only in the ſex that they affect. But they may certainly be diſtinguiſhed from each other in many other reſpects; in their ſymptoms, their cauſes, and their method

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of cure. We ſhall not attempt to examine them accurately in all theſe particulars. The whole that we ſhall endeavour to do, will be to point out a difference between them, that ſeems to reſult from our ſubject. They have both been conſidered in ſome meaſure as diſorders of the Imagination, ſuch an influence being always preſent when they are produced. For not only low ſpirits, fantaſtical ideas, and imaginary ſymptoms, have given riſe to them; but a fit of paſſion, great diſappointment, envy, jealouſy, an exceſs of love, and great grief, ſeems to have been equally inſtrumental in their production. Notwithſtanding this however, both theſe diſeaſes do not ſeem directly to flow from theſe cauſes, nor do they act upon the body in the ſame manner; but one of them ſeems to be a primary, whilſt the other is a ſecondary effect of their power: Beſides this, the Hypochondria may be produced without paſſion; but the Hyſterics ſeem as if they

they never could. Theſe ſentiments reſult from the following obſervations.

1. THE cauſe of the Hypochondria is often a ſluggiſhneſs of the fluids, proceeding from indolence and inactivity, long ſtudy and application, the ſtoppage of other diſeaſes, or ſome circumſtance of this nature; whilſt the cauſe of Hyſterics is too great an activity of the body, proceeding from ſome violent affection of the mind.

2. THE cauſe of the Hypochondria acts in a ſlow, deliberate, and determined manner, whilſt that of the Hyſterics is more active, violent, and outrageous.

3. THE perſons ſubject to the Hypochondria are grown up to mature age, very often are even old people, and are of the phlegmatic temperament; whilſt hyſterical people are almoſt always young and of

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the ſanguineous temperament, or moſt commonly are not to be diſtinguiſhed by this circumſtance.

4. The Hypochondria is an hereditary diſeaſe, and fixed in the conſtitution; but the Hyſterics are common to every one under particular circumſtances.

5. The ſymptoms of the Hypochondria are a previous weight, heavineſs, and uneaſineſs about the præcordia, but without the loſs of ſenſe, with no violent ſpaſmodic contractions, and no regular paroxyſms. The Hyſterics, on the contrary, come on without any previous pain, are attended with violent paroxyſms, loſs of ſenſe, and ſpaſmodic contractions of the internal parts. From theſe circumſtances we are induced to think, that the Hypochondria may be produced without paſſion, and proceeds from ſome obſtruction in the body; that when paſſion is the cauſe of it, it is by bringing on this obſtruction; and that the lowneſs

lowneſs and depreſſion of ſpirits which attend it, are the effect of an active mind endeavouring to overcome the activity of a ſluggiſh body. The hyſteric affection, on the contrary, we may conſider as the immediate effect of a paſſion of the mind, which acts as a ſtimulus upon the body, and produces violent ſpaſms and contractions in different parts. It is not dependent however upon any particular paſſion, or confined to any ſex. Fear, anger, anxiety, and love, are equally productive of it. It is to the laſt of theſe, indeed, that it is moſt frequently to be aſcribed, and as in the delicate ſex this paſſion ſeems more lively and animated, it has been not only appropriated to them, but has been thought to proceed from the uterus. It is an opinion, that is probably ſo erroneous, that it was worth while to controvert it; and we hope we have not entirely failed in our attempt, when we have endeavoured to eſtabliſh this diſorder upon a foundation more agreeable to the ſymptoms with which it is accom-

panied, and the affections of mind, that are always preſent at its acceſs.

IT might now, perhaps, be thought neceſſary that we ſhould enquire into a further act of the mind over the body, and evolve thoſe actions that proceed from the will. A power of the ſoul infinitely ſuperior to any that we have as yet examined, where its motions are in the body more evidently to be perceived, and which can effect a more conſiderable influence. But yet, as it is confined to a particular ſyſtem, and can enjoy very little authority further than its own acts; as none of the neceſſary functions can poſſibly depend upon it, nor any of thoſe diſorders which infeſt the human conſtitution; and beſides, as its power is ſo evident as to require no proof; I hope we ſhall have a ſufficient excuſe for entirely omitting a conſideration of this kind.

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CONCLUSION.

IT is neceſſary, however, before we entirely leave the ſubject to deduce from it a conſequence, that may be of ſervice to mankind in a moral and religious view, as well as being the neceſſary effect of a natural truth. If we have in any meaſure demonſtrated, that the leaſt atom cannot be moved from its place, but by the intervention of ſome ſpiritual being; that the vegetable tribe acknowledge the direction and governance of a peculiar agent; and that the loweſt action in our bodies, is performed by a part of that thinking and rational principle which conducts the higheſt and moſt noble; have we not the moſt ſatisfactory proof of the exiſtence of ſubſtances, independent of body, and diveſted of all materiality. We may infer likewiſe from this truth, that this ethereal ſubſtance

partakes

partakes of none of the affections of matter, and that nothing is more ridiculous than to ſay the ſoul can be divided as the body is. It muſt always be conſidered as a ſuperior agent, which notwithſtanding it can act upon no other body, yet acts upon that part alone which is entire and ſound; and when part of that is taken away, we have no right to ſay any otherwiſe, than that it acts over a leſſer part than it did before. From the whole then we may conclude, that the ſoul is neceſſary to the exiſtence of the body; but that that form of matter is ſo far from contributing to its powers, that it confines and ſhackles them. And from hence we hope, one day or other, to be freed from theſe chains, and be raiſed up to a more glorious exiſtence, where it can exerciſe all its faculties with greater liberty, and be independent of ſuch diſagreeable reſtraints.

FINIS.

28.4.16.

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ERRATA.

Page ix. Introduction, line 6. place *a* before *Carte*.
37. l. 14. for *endued* read *induced*.
57. l. 5. for *of* read *in* 2d *of*.
77. l. 8. dele *more*; l. 9. for *that* read *they*.
78. l. 21. dele *upon*.
94. l. 5. for *effected* read *affected*.
115. l. 6. for *infallible* read *fallible*.
138. l. 10. place *a* before *tender*.
165. l. 11. place *and* before *then*.
166. l. 10. place *it* before *could*.
285. l. 11. for *Gravitation* read *Gratification*.
288. l. 10. for *cauſes* read *caſes*.
298. l. 15. for *external* read *internal*.
299. l. 16. for *competent* read *incompetent*.
332. l. laſt, for *purpoſes* read *purpoſe*.
344. l. 6. for *theſe* read *we*.
359. l. 8. for *tracting* read *tracing*.